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V. C. WYNNE-EDWARDS
Regius Professor of Natural History
Aberdeen University

AND

JAMES W. CAMPBELL

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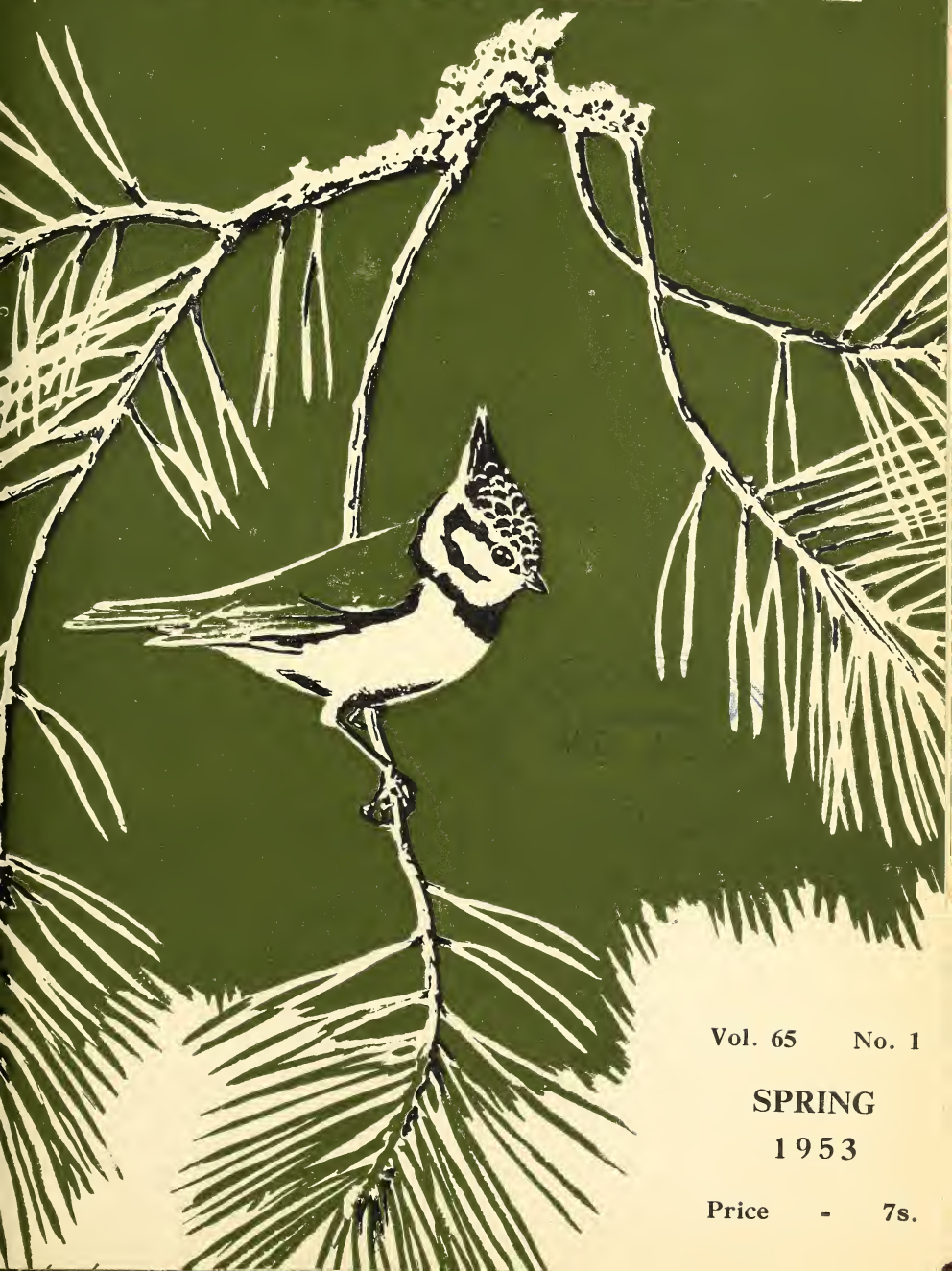

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The Scottish Naturalist

Volume 65, No. 1 Spring 1953

NOTES ON BIRDS IN THE CLYDE AREA, 1951 *

M. F. M. Meiklejohn and C. E. Palmar
Glasgow

This second report, like its predecessor (*Scot. Nat.*, 64 : 26-30), is confined to selected records of the rarer species. Most of these refer to 1951, though a few notes from previous years have been included. Additional information concerning breeding, distribution and status of both common and rare species is at present being filed for future use. It is now becoming evident that the absence of any centralised recording during recent years has resulted in many interesting records remaining unpublished for our area.

As before, in addition to the Clyde watershed, we are dealing with that part of the Forth area which is most conveniently reached from Glasgow, namely, the Aberfoyle district.

We thank all who have taken the trouble to send us notes. The contributors of the notes below are : J. Alasdair Anderson, Miss W. U. Flower, Dr. J. A. Gibson, A. G. Gordon, Nicol Hopkins, Miss M. I. Kinnear, Miss E. R. Landells, D. Summers-Smith, the Rev. E. T. Vernon and the compilers.

Raven *Corvus corax*

One flew over Richmond Park, Glasgow, on 17th October 1951 : carrion crows present afforded comparison of size (N. H.).

Hawfinch *Coccothraustes coccothraustes*

One near Luss, 20th October 1944 (J. A. G.).

* *Received 10th December*, 1952

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Siskin *Carduelis spinus*

One seen at Pollokshields on 1st May 1946 (D. S.-S.).

Crossbill *Loxia curvirostra*

Two seen at Lochwinnoch on 14th October 1945 (J. A. G., birds also observed by the late T. Thornton McKeith). A male seen in Hamilton Park on 13th January 1951 attracted attention first by its pale yellowish rump as it flew into a yew-tree, where it remained in view feeding for a short time. Red colour of head and very forked tail observed. It is idle to speculate as to the race to which the bird belonged (M. F. M. M.).

Snow Bunting *Plectrophenax nivalis*

E. T. V., in many years observation, has only one record for the area—from Eaglesham Moor in October 1949 : the species seems to have become very much scarcer since the publication of Gray's *Birds of the West of Scotland* in 1871.

Tree Sparrow *Passer montanus*

N. H. saw one near Balmore " a number of years ago " and on 13th March 1951 fourteen were observed in the same area, by the Roman Wall near Summerston, the birds being in Lanarkshire (M. F. M. M.).

White Wagtail *Motacilla alba alba*

Seen at Stevenston between 20th April and 9th May 1951, the maximum number being twenty (M. I. K.).

Waxwing *Bombycilla garrulus*

Two seen at Kilmacolm in 1949 (E. T. V.). One, found wounded near Brodick on 27th April 1951, was reported to C. E. P.

Pied Flycatcher *Muscicapa hypoleuca*

A female, Richmond Park, Glasgow, from 24th to 26th May 1951 (N. H.). In the Loch Ard area on 9th June 1951 excellent views were obtained of a male and, on the next day, a female was seen carrying a long piece of wool (E. R. L.: see *Edinburgh Bird Bulletin*, I (6) : 70).

Golden Eagle *Aquila chrysaëtos*

An immature bird was seen at Portencross on 21st October 1951; it was flying at a considerable height over the sea in a

north-westerly direction and was pursued by a pair of buzzards (M. F. M. M.).

WHITE-FRONTED GOOSE *Anser albifrons*

One, of unknown race, was seen at Barr Loch on 26th November 1951 (J. A. A.). There seem to be few Renfrewshire records of this species.

SHELD-DUCK *Tadorna tadorna*

One, Bothwell Bridge, 20th March 1951 ; in the preceding year one was seen there on 17th March (see *Scot. Nat.*, 64 : 28) (M. F. M. M.).

GADWALL *Anas strepera*

A pair, Dawsholm, 27th February 1946 (E. T. V.). A pair was present in the neighbourhood of Possil through most of March and April 1951 (M. F. M. M.). One, Possil, 26th September 1951 (A. G. G.). One, Richmond Park, Glasgow, 5th November 1951 (N. H.).

LONG-TAILED DUCK *Clangula hyemalis*

One, Castle Semple, 26th November 1949 (J. A. G.). One, Ardeer shore, 27th and 28th December 1951 (M. I. K.).

CORMORANT *Phalacrocorax carbo*

In view of the few records of this species from Lanarkshire (cf. *Scot. Nat.*, 1935 : 169 and 1939 : 49), it seems worth while to record the following occurrences at Bothwell Bridge in 1951: 22nd February, one; 27th February, one; 3rd March, six; 20th March, two (M. F. M. M.).

TURTLE DOVE *Streptopelia turtur*

One, Fairlie, 16th August 1948: two, Lochwinnoch, 17th August 1948 (J. A. G.).

LITTLE STINT *Calidris minuta*

E. T. V. has records from Barassie, October 1940, and Gailes, September 1946. Two, Hunterston, October 1951 (M. I. K.).

GREEN SANDPIPER *Tringa ocrophus*

One, Bothwell Bridge, 1st August 1951 (M. F. M. M.).

SPOTTED REDSHANK *Tringa erythropus*

One, Hamilton, 11th and 16th October 1951; excellent views were obtained of its long bill, plain wings, white rump

contrasting with darker tail and mottling on the back. The *che-wit* call was several times heard (M. F. M. M., W. U. F.). This appears to be the first record of the species for Lanarkshire.

Grey Plover *Squatarola squatarola*

A bird of this species was seen at close quarters at Hamilton on 16th October 1951. We can trace no previous record of this species for Lanarkshire. The bird was on the edge of a shallow pool, a few yards distant from the first spotted redshank for the county (M. F. M. M.).

Glaucous Gull *Larus hyperboreus*

An immature bird in "mealy" plumage was seen at Hamilton on 19th January 1951. At one moment it and the Iceland gull mentioned below were seen through glasses simultaneously, both of them being the first individuals of their species to be recorded for Lanarkshire (M. F. M. M.). See also under following species.

Iceland Gull *Larus glaucoides*

One was watched at Girvan on 19th April 1949 for quarter of an hour at ten feet range: it was compared with neighbouring glaucous and herring gulls, when its smaller size and more slender bill were noted (J. A. G.). The Iceland gull already reported from Hamilton (*Scot. Nat.*, 64 : 30) was seen at frequent intervals throughout 1951.

Great Skua *Stercorarius skua*

One, between Ailsa Craig and Girvan, 4th April 1950 (J. A. G.).

Arctic Skua *Stercorarius parasiticus*

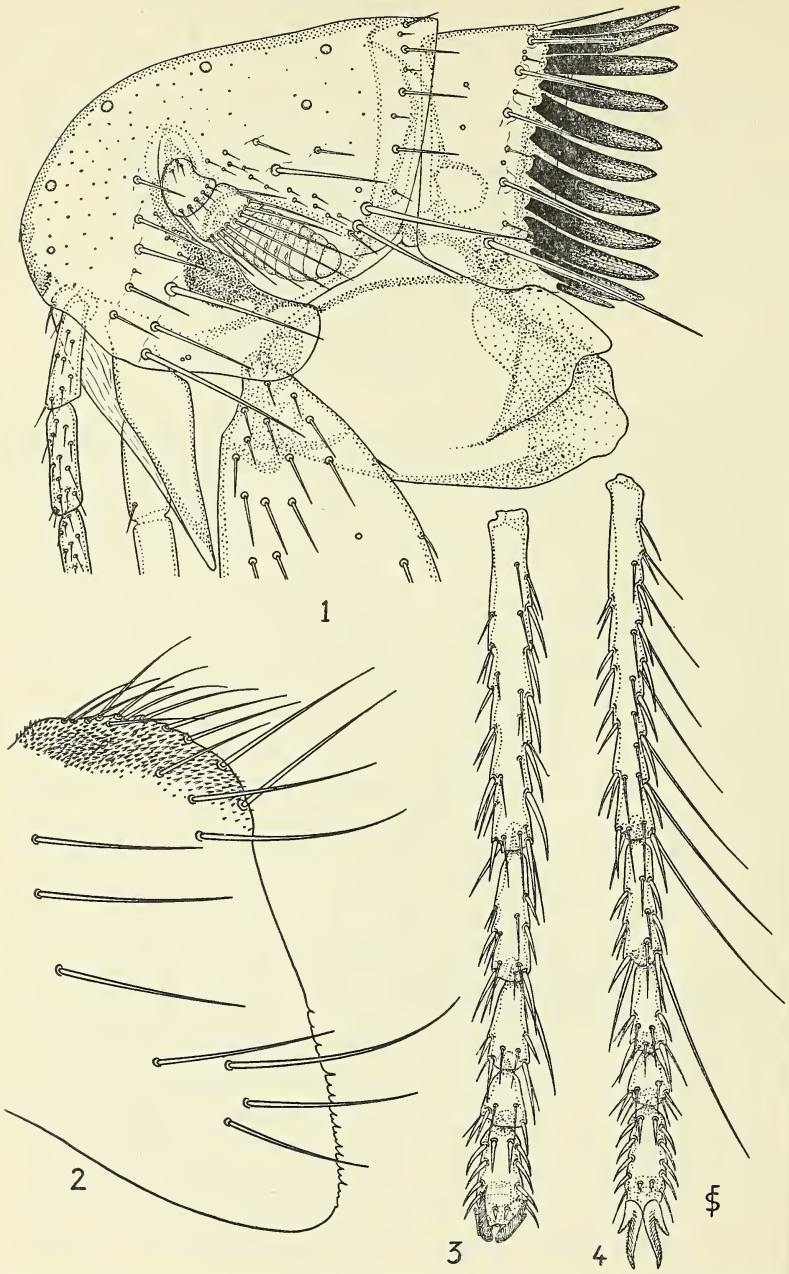
A bird of the dark phase was seen at Stevenston on 28th May 1951 (M. I. K.). One, chasing a tern off Keppel pier, 9th September 1951 (C. E. P.).

THE PRESENCE IN SCOTLAND OF *TARSOPSYLLA OCTODECIMDENTATA* (Kol.), A FLEA HITHERTO UNRECORDED FROM THE BRITISH ISLES *

F. G. A. M. Smit
British Museum (Natural History)
The Zoological Museum, Tring, Herts.

In the Rothschild Collection of Siphonaptera at Tring there is a series of 2♂ 9♀ *Tarsopsylla octodecimdentata* (Kolenati), 1863, from [the Pass of] Killiecrankie, Perthshire, ex *Sciurus vulgaris*. These specimens had been correctly determined but have never been recorded in print before, evidently because of the incompleteness of the data. Neither date nor collector being known, it would have been rash to add the species to the British list because of the possibility of mislabelling or some other form of error. But there is no improbability in the suggestion that the species might occur in Scotland and it seemed worth attempting to corroborate its occurrence. I therefore checked through the roughly eighty tubes containing British specimens of *Monopsyllus sciurorum sciurorum* (Schrank), 1803 (the common and hitherto only known indigenous species of flea associated with the red squirrel in the British Isles), preserved in alcohol, and I was lucky enough to come across a batch consisting of one female of *Tarsopsylla octodecimdentata* and one male and two females of *Monopsyllus sciurorum*, collected ex *Sciurus vulgaris* at Pitlochry, Perthshire, 16th March 1898, and presented to the Rothschild Collection by M. Pease. This finding of *T. octodecimdentata* among *M. sciurorum* (both are monoxenous fleas of *Sciurus vulgaris*) leaves no doubt as to the occurrence of the species in Scotland and it is now safe to accept the series from Killiecrankie. The latter locality is only two or three miles from Pitlochry, which makes one wonder whether these two lots were originally one batch.

* *Received 3rd December*, 1952



Tarsopsylla o. octodecimdentata (Kol.). Fig. 1. Head and prothorax of female (from Holland). Fig. 2. Tergum VIII of male (from Scotland). Fig. 3. Hind tarsus of female. Fig. 4. Hind tarsus of male.

Tarsopsylla octodecimdentata belongs to the family Ceratophyllidae and is the fifty-fourth species of flea to be recorded from the British Isles; it is a Palaearctic species, now known from Scotland, Holland, Germany, France, Spain, Switzerland, Austria, Hungary, Slovakia, Yugoslavia, Bulgaria, Russia, Estonia, Finland, Sweden, Transbaikalia and other localities in north Asia. Apparently this flea occurs principally in mountainous regions, though it has been found in Holland in the country on the east side of the river IJsel, which is as flat as most of the rest of that country. In North America there is a very closely related form, *T. coloradensis* (Baker), 1895, which is the only other known species the Holarctic genus *Tarsopsylla* contains (*uralensis* Wagner, 1898, is a synonym of *octodecimdentata* (Kol.), 1863). Close comparison of the two representatives of the genus convinces me that they can very well be regarded as subspecies; there are now a number of known instances in which a Palaearctic species which extends its range into Asia has subspecies in the Nearctic Region.

T. octodecimdentata coloradensis agrees in habits with *T. o. octodecimdentata*, since it also lives mainly on tree squirrels (though these are of another genus—*Tamiasciurus*) and is, according to George P. Holland (1949, The Siphonaptera of Canada, *Dept. Agric., Canada, Techn. Bull.*, 70 : 144) essentially a flea of the mountains and the northlands. Mr. Holland also notes that " There is evidence that *Tarsopsylla* is a nest flea, which may account for its excessive rarity in collections ". The same may be true for the Palaearctic subspecies; the few times I got this flea in Holland from a red squirrel there were only one or two specimens among a number of *M. s. sciurorum*. Another remark made by Mr. Holland is of interest: " In spite of its long legs, *Tarsopsylla* appears to be a rather sluggish flea, and no specimens were noted to jump vigorously ". It seems to be a general rule in fleas that the ones with long and slender legs are walkers and climbers rather than jumpers, while those with stout and relatively short legs seem to be the jumping champions.

The true host of *T. o. octodecimdentata* is the European red squirrel *Sciurus vulgaris*; this host is still present in Scotland, while in the greater part of England it has disappeared and its place taken in by the introduced American grey squirrel *Sciurus carolinensis*. If *Tarsopsylla* also occurs in England and

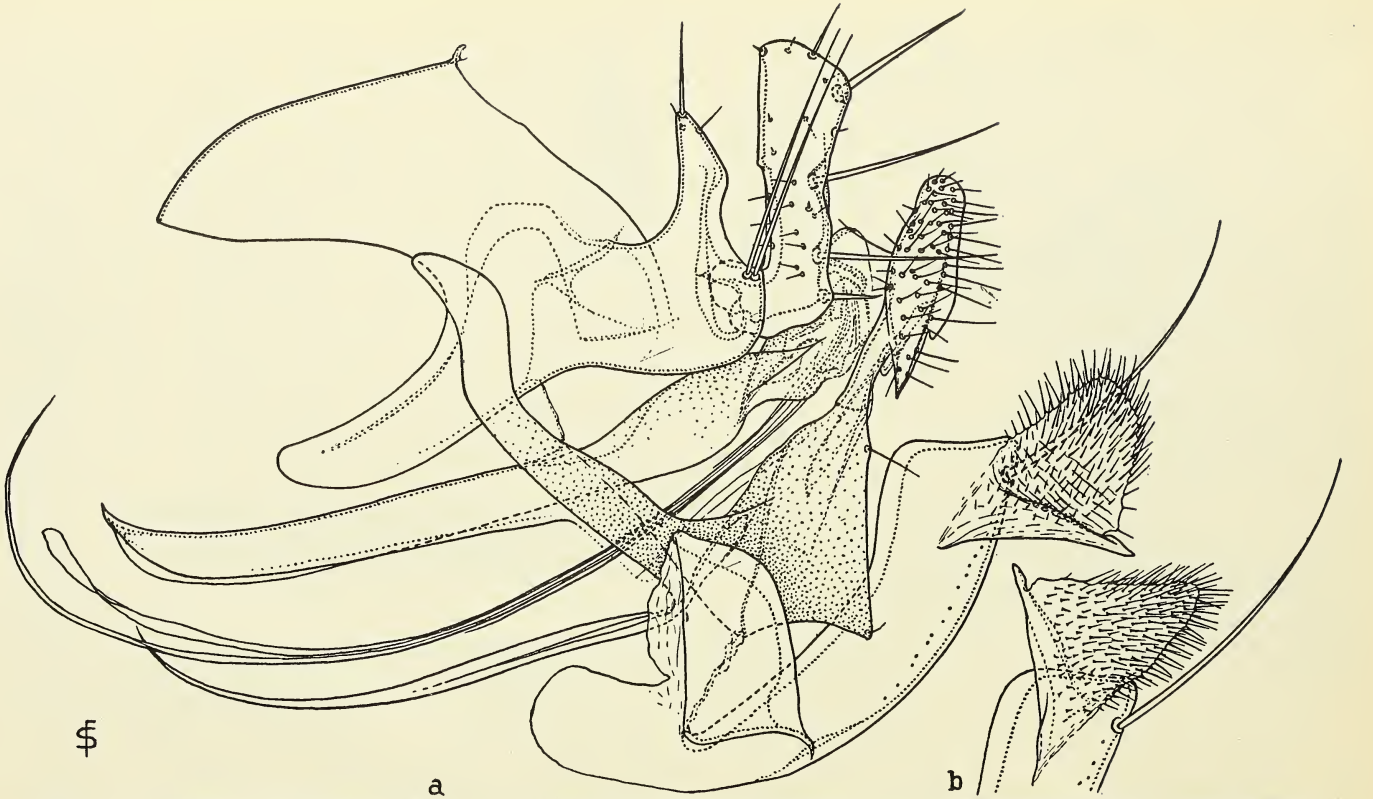
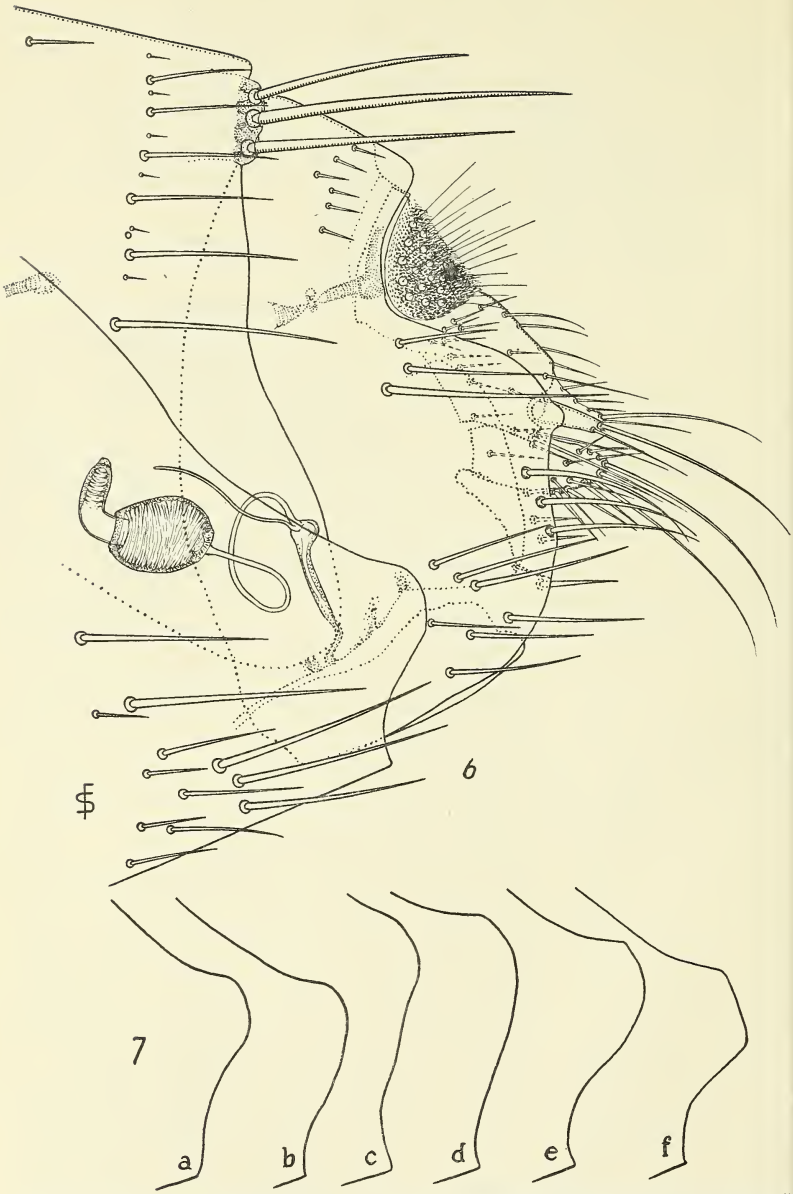


Fig. 5. *Tarsopsylla o. octodecimdentata* (Kol.). (*a*) Genitalia of male (from Scotland). (*b*) Apex of sternum VIII of male to show the upturned apical process (from Scotland).

Wales, it would have been compelled to switch over to the grey squirrel in most areas, just as *Monopsyllus* has done. Whether *Tarsopsylla* can adapt itself to the grey squirrel is not known and in order to establish this fact much collecting of squirrel-fleas, preferably from nests, should be done ; this would also further our knowledge of the distribution and occurrence-frequency of both insects.

Tarsopsylla octodecimdentata is easy to identify and drawings of the taxonomically most important parts of the insect are given here as an aid in this respect. It may be useful to point out the characteristic features of this flea. The first hind tarsal segment is very long, its length being greater than that of the three following segments together (Figs. 3, 4); no other known fleas have such a long first hind tarsal segment. The tarsi of *Tarsopsylla* show a remarkable sexual difference in their chaetotaxy: the males have long slender posterior setae at each first tarsal segment (Fig. 4), while in the females these setae are short (Fig. 3) ; the second hind tarsal segment has a long apico-posterior seta which reaches to the middle of the fourth segment in the female and to the middle of the fifth segment in the male. The frontal tubercle is vestigial and in Fig. 1 it is shown in its most prominent form. There are three antesensilial setae (one of which is minute) in the male and normally three (though not seldom four) in the female. Tergum VIII of the male bears a well-developed area spiculosa on the inner surface below the dorsal margin (Fig. 2). The male genitalia are depicted in Fig. 5. In mounted specimens the spiculose apical membranous process of sternum VIII is either turned upwards (Fig. 5 *b*) or downwards (Fig. 5 *a*); it is always turned upwards in unmounted specimens, so this is evidently the natural position. The female terminalia are shown in Fig. 6, while Fig. 7 (*a-f*) shows the variation in the outline of sternum VII of six females from Killiecrankie.

From the viewpoint of flea-faunistics Scotland is a most interesting region: of the six latest additions to the list of fleas from the British Isles, three came from Scotland (i.e. *Megabothris rectangulatus*, *Frontopsylla laeta* and *Tarsopsylla o. octodecimdentata*). Further collecting of fleas from mammals as well as from birds (nests) may possibly reveal more species new to the British fauna; in any case, it would further our knowledge of the distribution of fleas already known from the North.



Tarsopsylla o. octodecimdentata (Kol.). Fig. 6. Terminalia of female (from Holland).
Fig. 7. (*a–f*). Posterior margin of sternum VII of six females (from Scotland).

THE DISTRIBUTION OF THE NORTHERN DART, *AGROTIS HYPERBOREA* (Zetterstedt), ON THE MAINLAND OF SCOTLAND *

KENNETH TOD,

Natural History Department,
University College, Dundee

THE species was first discovered in Perthshire in 1839, when, according to South (1920, p. 215), a single specimen was taken on " Cairn Gowr ". This discovery is also referred to by Barrett (1899, p. 235), where the locality is given as " Cairn Gowr, Ben Ghlo ". This will undoubtedly be the Cairn nan Gobhar of Ben-y-Gloe which is the highest summit of that mountain (ref. One-Inch Ordinance Survey, Sheet 49). No other examples were noted until 1854, when a second specimen was found in the same locality, as recorded both by South and Barrett; the collector was possibly the James Foxcroft mentioned by Newman in his *British Moths* (1869, p. 356).

Between 1854 and 1876 Barrett cites three records:

1870—Schiehallion, by T. W. Salvage.

1873—" A pupa was found in moss on one of these mountains by a coleopterist." This is perhaps the same as that reported by J. S. Allin, *Scot. Nat.*, 1873, 2: 162 who says: " When tearing up moss on a hill side in Braemar last July (i.e. 1873) I found a chrysalis."

1874—" On a mountain of the Breadalbane district of Perthshire, also at a height of 3,000 feet."

As a result of a determined effort in 1876 a number were secured on the wing, and a female was detected laying eggs on crowberry (*Empetrum nigrum*). The latter observation gave the clue to the food-plant and resulted in the subsequent discovery of larvae and pupae. In Barrett (*loc. cit.*, p. 234) F. D. Wheeler is quoted as saying: " It appears to inhabit the highest mountain peaks on the south side of Loch Rannoch." These important discoveries of Wheeler and N. M. Richardson

* *Received 18th December 1952*

are referred to also by Dr. F. Buchanan White in *Scottish Naturalist*, 1877, 4: 12. In 1878 Buchanan White (*Scot. Nat.*, 4: 341) refers to " an imago on a mountain near Glen Tilt last July " (i.e. 1878).

Following the publication of Barrett's work K. J. Morton (*Ann. Scot. Nat. Hist.*, 1899: 55) gave a record for Inverness-shire, " on the great range of the Cairngorms ", and William Evans (*ibid.*, 55-56) states that he " found the larva near Dalwhinnie in 1892 ".

Regarding life-history and general habitat the following facts are now accepted. (*a*) In the central area of Scotland, i.e. all the region south of the Great Glen, the species has been found only at a minimum elevation of 2,000 feet. (*b*) The main food plant is apparently crowberry (*Empetrum nigrum*), although bearberry (*Arctostaphylos uva-ursi*), cranberry (*Vaccinium vitis-idaea*), and even the mountain azalea (*Loiseleuria procumbens*) growing at 2,000 feet in conjunction with crowberry, cannot be ruled out. (*c*) The life-cycle is biennial, of which the greatest part, some twenty-two months, is spent in the larval stage. (*d*) The pupal stage is reached and the imagines found only in the even-numbered years.

It is strange, however, that the first discovery of the insect was made in an odd-numbered year (1839), and attempts, so far unsuccessful, have been made to establish whether there does occur a limited emergence in such years. It should be noted that the only other mention that can be traced of a pupa being found in an odd-numbered year is that recorded as being discovered near Braemar in 1873 by J. S. Allin, already quoted. It is a pity that there are not more details about these two records. Barrett (loc. cit., p. 235), not being aware of the records from the counties of Aberdeen and Inverness, remarks: " There appears to be no reason why this species should be confined to the mountains of Perthshire, and there is little doubt that it will be found in other counties of Scotland where the mountains rise to a similar elevation." From the afore-mentioned records it was evident that the species had a fairly wide range, i.e. in the counties of Perth, Aberdeen, and Inverness. Subsequent to 1876 it seems that only single specimens were found, and while the discoveries of Wheeler and Richardson suggest that a number were collected by them,

The Northern Dart, *Agrotis hyperborea* (Zetterstedt). Forms from three Scottish Highland localities

Upper left : typical Rannoch form ; colour rosy.
Middle left : typical Monadhliath form ; colour darker than in Rannoch form, ground colour with much black and light blue.
Lower left : typical East Grampian form ; colour reddish brown.
Right side : a typical East Grampian form.

[*To face p. 12*

no indication is given of the exact quantity. Again, the records of Morton and Evans in Inverness-shire, as already quoted, suggest only single specimens being found.

Between the end of the last century and 1942 there is little record of the number of specimens taken or the discovery of new localities. This may be due to two reasons, (*a*) the difficulty of discovering the pupation site, and (*b*) newly found localities being kept secret by their discoverers. It must be realised that the species was considered rare in Scotland and a high value was placed upon it by dealers and collectors. The commercial value attached to the rarer lepidoptera has always tended to the suppression of information of possible scientific importance. Any new locality publicised is liable to be raided to obliteration by unscrupulous collectors. It is therefore not to be wondered at if discoverers of new localities, who are interested solely in their scientific importance, have kept the information to themselves. In recent years, however, from 1942 to 1948, a breeding ground with what was a dense concentration was found on the southern edge of the Monadhliath Mountains in Inverness-shire, as well as three or four others grouped together in the Angus Mountains.

Method of Collecting

Certain difficulties attend the search for this species. The easiest method, and the one most productive of a high percentage of imagines, is pupa hunting. The last larval instar is fairly easily discovered by turning back the food plant (crowberry) and may be successfully reared in captivity by feeding on ordinary garden carrot (root). No success has attended my efforts to bring it to maturity from an earlier stage. The imago may be attracted to light, but favourable conditions for so doing at any height over 2,000 feet (even in July) are few and far between. In 1940 information was obtained from an entomologist of wide experience that the best place to find the pupae was at the sides of the beaten tracks made by hares or sheep. By carefully lifting the thin carpet of grey lichen and crowberry with the fingers the pupae might be found lying just below the surface on the edges

of the tracks. On testing this idea in 1944 it was found to be correct. Previous efforts had consisted in tearing up the plant carpet in a haphazard manner over a wide area. This is a destructive way of collecting, also one which is not very successful, and it had become apparent that, if one was not to lay waste the locality and destroy the food plant there, some more scientific method would have to be found. As to why the larvae chose the edges of hare and sheep tracks, the answer seemed to be that drainage was involved. The breeding ground is generally wet, but the channel of the tracks is usually an inch or more below the edges where the pupae are found. Heavy rain is thereby drained off into the channel and the pupa does not become water-logged. It seemed reasonable to suppose that there must be other types of sites on the breeding ground which afforded suitable drainage for the pupae, and in the Rannoch district, at 2,300 feet, this idea was put to the test in 1946. Close examination of the ground surface beneath the plant carpet revealed hardly perceptible rises and falls in the ground hidden by the top covering of vegetation. If this was removed carefully from one of these small rises, underneath or just adjacent to the food-plant, a pupa would more often than not be found either on or just below the top of the rise. No pupae were found in the wet hollows where there was danger of an excess of water. Using this method forty pupae were uncovered in a short time within a comparatively small area and without undue disturbance of the plant covering.

Distribution

(1) *The Monadhliath Mts.* This ground was discovered in 1942 and was fully reported on by Russell and de Worms (1944). I first visited the site in 1946, after carrying out the above-mentioned tests at Rannoch. The site is on the eastern edge of the Monadhliath range, stretching from Gheall Carn Mor (2,700 feet) north-east for some $1\frac{1}{2}$ miles. Much of the surface covering had been torn up in a haphazard manner in the two previous seasons (1942, 1944), and on reaching the ground a number of collectors were found at work. The pupal concentration at this locality was dense,

but it was obvious that immense inroads were being made by collectors, one being reported as having taken 500 pupae in the previous season. I took sixty pupae, but a good proportion of these were found in an undisturbed place about a mile to the east of the popular locality. The method of search had to be rather different from that used at Rannoch. The food-plant is in small patches, not in an all-over carpet, and grows amongst a plant complex of stunted heather and grey lichen. Here the habit of the larva seemed to be to move off the food plant on to the grey moss and lichen surrounding it and pupate under this covering at the edge of the plant. It was noticed, however, that the same preference was given to a well drained site as at Rannoch. A further visit was paid to this gound in 1950 in the second week of June, and the area examined showed that there was hardly one plant of crowberry which had not been disturbed and often torn up by the roots. Not a single pupa was found, and it is very doubtful whether this locality will survive the devastation by collectors.

(2) *Angus Mts.* This zone, as far as is known, has never previously been prospected for *A. hyperborea.* A great extent of the tops and ridges is rough grassland as high as 2,800 feet, but there are also large stretches of heather interspersed with the typical moss-Empetrum carpet suitable for a breeding ground. Two adjacent grounds were eventually found, one on the south-east and the other on the south-west side of the same mountain, at a height of 2,800 to 2,900 feet. Evidence of another ground was found on a nearby height at an elevation of about 2,500 feet, but only three or four pupae were uncovered here, just round the summit. It was impossible to prospect any further that season owing to limited time and to hill mist. Another adverse factor was the extreme dryness of the ground which made the moss very brittle, and matters were further complicated by a growth of dwarf *Vaccinium vitis-idaea* with long shoots running just under the surface of the ground. Removing the upper covering of vegetation was more than usually hard on the fingers, and on at least eight occasions pupae were badly damaged by the strands of *vitis-idaea* and bits of hard lichen. This extreme dryness appeared to reverse the larva's habit of finding a suitable pupating site, for instead of the driest place on the small rises in the ground, they chose

the damper hollows. In all twenty-four perfect pupae were taken in four visits. In 1948 three other heights near the above-mentioned localities were examined and all three showed typical *hyperborea* ground, uncomplicated by *V. vitis-idaea*. On the first height a few pupae were found round the summit, but on the second height, on the south-west shoulder, there was discovered a very good concentration quite equal to that found nearby in 1946. On the third summit only one pupa was found, but the area of typical ground was very small.

(3) *Ben-y-Gloe.* As to whether this locality has been visited since last century, it is hard to say. There appear to be no records, apart from those already mentioned. It is not an easily accessible area, having to be approached either by way of Glen Tilt, from Blair Atholl, or by the track up Glen Fearnat, which branches off the Kirkmichael-Pitlochry road, about 1½ miles north-west of Enoch Dhu. Either approach to the locality necessitates a long trek, with a final climb of some 2,600 feet. The locality in the Rannoch area on Meall Breac, which is easily reached from Kinloch Rannoch, has certainly been exploited by collectors for many years, and it is safe to assume that this locality has attracted their attention in preference to the more remote habitat on Ben-y-Gloe.

(4) *Rannoch District.* The locality on Meall Breac (2,300 feet) is too well known to require much comment. The area to the south of the first summit used to carry a good concentration of insects, and here the plant complex was a carpet of stunted heather, grey moss and crowberry. The ground rises for a mile to the south, to a height of some 2,500 feet, and while a few pupae may always be found where the crowberry grows amongst the stunted heather, by far the greater density of population occurs at the lower elevation.

(5) *Western Cairngorms.* In August 1948 a dead imago found amongst crowberry and stunted heather at a height of over 3,000 feet confirmed K. J. Morton's record for the Cairngorm Mountains already quoted. A search in 1950 uncovered only one pupa in June. In the same month a search was made on another height two or three miles to the north, and two pupae were found. Further research would probably reveal an area of more dense population.

In June 1950 an extensive survey was undertaken in Sutherland and Wester Ross to discover the extent of crowberry distribution and whether the plant was in sufficient quantity to hold a population of the moth. It had to be borne in mind that the elevation at which the alpine plant-carpet exists in the north of Scotland is considerably lower than in the central zone. Wide areas were examined, from a height of 1,200 up to 2,600 feet, both in the centre and north of Sutherland and in the centre and coastal districts of Wester Ross. The result was disappointing. A sparse growth of crowberry was found in widely scattered areas, from 1,500 up to 2,000 feet, but nowhere did there appear to be sufficient to sustain even a small population of *hyperborea*. No evidence of pupae was found.

As far as can be determined the range of the species on the mainland would seem to be confined to the central districts south of the Great Glen.

Variation

The species is one of the most variable in the British Isles. Generally speaking, the basic coloration of the majority of specimens differs in the three localities of Rannoch, Monadhliaths, and Angus, but specimens taken in each of these localities sometimes are indistinguishable from one another. It is impossible therefore to point to any one specimen as coming from any one district. The Rannoch insects are mainly of a rosy colour. Those in the Monadhliaths are much darker, with a great deal of black and light blue in the ground colouring, the light blue turning to an ashy grey some months after the specimens have been killed and set. Those found in the Angus localities are reddish brown, with many extreme variations not found in either of the other two habitats. Specimens from all three localities are in possession of the Natural History Department, University College, Dundee.

A Suggestion

These notes present some of the field work carried out on this species by one individual only, and are by no means

claimed to be conclusive. Doubtless there are others who have worked in the field on this most interesting moth, and whose knowledge and experience would enable them to add much information on its range and variation in Scotland. Full details of the localities mentioned here have been lodged with the Nature Conservancy, 12 Hope Terrace, Edinburgh 9, for their confidential records, as well as with the Natural History Department, University College, Dundee. Other entomologists might similarly record their findings with the Nature Conservancy so that their knowledge be preserved and the localities which they have discovered be safeguarded in the future.

I wish to express my thanks to the Bowden Entomological Trust of Glasgow University, from which, at the hands of Professor A. D. Peacock, University College, Dundee, I have received a grant in aid of my field work.

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THE BIRDS ON ST. KILDA, 1952 *

T. B. Bagenal

The Marine Station, Millport

With the kind permission of the Marquess of Bute, a party visited the islands of St. Kilda from 24th July to 10th August 1952. The expedition lived on Hirta and visited Dun on five occasions, but it was not possible to go to any of the other islands.

A thorough census of all the birds was not attempted, because the breeding season of most species was over, and also because the topography can hardly allow even the most careful census to be at all accurate. Nevertheless, with some of the less common species, an attempt was made to determine the minimum number that was present. Each evening a "roll-call" was held; and I would like to thank all the members of the party who contributed their notes and patiently accepted my scepticism, and being cross-examined at length.

The results are given in the systematic list below, which follows the order given in the *Check-list of the Birds of Great Britain and Ireland*, published by the British Ornithologist's Union (1952).

Leach's Petrel *Oceanodroma leucorhoa*. No night excursions were made to Dun, and this species was not reported.

Storm-Petrel *Hydrobates pelagicus*. The only definite record was of a bird heard in a burrow in a cleit on the edge of Na h-Eagan on 3rd August. The noise was rendered (before consulting *The Handbook*, Witherby, 1940) as *Purrrr... rrr chicka* repeated over and over again. Petrels were seen flying then, and on 9th August one adult was seen in a burrow on Mullach Bi, and a chick on Dun; but in all these cases it was not possible to determine the species. Many burrows were examined along the south-western side of Hirta between Dun and the Cambir and from many, particularly those on the higher ground, the musty smell characteristic of petrels was recognised.

* *Received 17th December* 1952

Manx Shearwater *Puffinus puffinus*. Heard calling over Mullach Bi on 27th July, on south-west slopes on 3rd August, loud and clearly over Dun on 3rd and 9th August, and over the village on 27th July and 10th August. No birds were seen, and neither were any carcasses or skulls, which are so often found if the species is at all plentiful.

Great Shearwater *Puffinus gravis*. One seen at 6 a.m. on 10th August when two-thirds of the way back to the Sound of Harris.

Fulmar Petrel *Fulmarus glacialis*. Very abundant.

Gannet *Sula bassana*. Catching mackerel on most days in Village Bay.

Shag *Phalacrocorax aristotelis*. The most seen together was ninety in Village Bay. Young were present among boulders on the west side of Glen Bay, and at the Castle on Dun 200 feet above sea level.

Common Eider *Somateria mollissima*. Males, females and young present every day in Village Bay; also seen in Glen Bay and on the south-west side of Dun and Hirta. No nests were found, but it seems that the increased population noted by Fisher (1948) has been maintained.

Peregrine Falcon *Falco peregrinus*. None seen, although specially looked for. Its absence is of interest as peregrines have bred on St. Kilda for very many years.

Kestrel *Falco tinnunculus*. Very probably breeding. First seen by J. M. Boyd on 27th July, thereafter seen daily by all members of the party, most often on Glacan Oiseval, though also on Conachair, Am Blaid and Na h-Eagan. One adult male and one female were definitely distinguished, besides two others which appeared to be juveniles. The most seen together was four on 6th August. The birds were often seen hovering.

Corncrake *Crex crex*. Only one seen and heard, always in a patch of iris by the Village Street opposite house number 8.

Oystercatcher *Haematopus ostralegus*. Very common and vociferous.

Lapwing *Vanellus vanellus*. One, Village Bay, 3rd and 7th August.

Ringed Plover *Charadrius hiaticula*. First seen on 30th July, thereafter fluctuating in numbers never more than five, on the Village Bay sand, or below the Store.

Golden Plover *Charadrius apricarius*. Always present on Mullach Sgar. Never more than four seen together. One had the typical plumage of a male of the northern subspecies *Ch. apricarius altifrons*, the others being either females or immature, with the northern racial characters not so clearly marked.

Turnstone *Arenaria interpres*. Flock on Dun 26th July. Fifteen in Dun passage 29th July.

Common Snipe *Capella gallinago*. Very numerous in the village and on the hillsides. Young often seen in the village meadows. Nest found by the old wall under Claigeann Mor. Chick ringed in Gleann Mor. Two on Dun 31st July. It seems probable that the numbers have increased considerably since 1947, when Fisher estimated there were only eight pairs breeding on Hirta.

Curlew *Numenius arquata*. Some calling over Glen Bay 2nd August. One seen in Village Bay 3rd and 7th August.

Sanderling *Crocethia alba*. One on the strand Village Bay 2nd August, and again on 9th August.

Great Black-backed Gull *Larus marinus*. Accompanied herring gulls. Thirty seen at once in Gleann Mor.

Lesser Black-backed Gull *Larus fuscus*. None seen.

Herring-Gull *Larus argentatus*. Adults and immature congregated during the day on the beach, Ruaival, and in Gleann Mor.

Black-headed Gull *Larus ridibundus*. One in Glen Bay 2nd August, thereafter one on the sand in Village Bay every day. Two were present on 7th and 8th August.

Kittiwake *Rissa tridactyla*. Breeding in various localities and congregating on other clearly defined cliff areas.

Razorbill *Alca torda*. Adults and young seen only among boulders at the Castle end of Dun.

Guillemot *Uria aalge*. Occupying ledges on Hirta and Dun.

Black Guillemot *Uria grylle*. Two in Glen Bay 31st July. Seen singly in Village Bay, Glen Bay and off the south-west coast.

Puffin *Fratercula arctica*. Very abundant.

Rock-Dove *Columba livia*. None seen, although searched for. This supports Fisher's statement that the species is probably extinct on St. Kilda.

Skylark *Alauda arvensis*. None were seen or heard. This species was first proved to breed on St. Kilda in 1947 (Fisher, 1948).

Swallow *Hirundo rustica*. Two seen by J. M. Boyd on Ruaival on 24th July.

Raven *Corvus corax*. Seen regularly all over Hirta; as many as eleven were seen together twice, namely on 1st August over Oiseval and 5th August over Mullach Bi.

Hooded Crow *Corvus cornix*. Three regularly on Oiseval, and two always present on Dun and Mullach Bi.

Wren *Troglodytes troglodytes*. On Hirta in the village, and on screes and on the sea cliffs, particularly among boulders. Two fledglings were ringed. On Dun about twenty were seen.

Wheatear *Oenanthe oenanthe*. Hirta. Three seen together on Mullach Geal, otherwise singly and not common.

Meadow-Pipit *Anthus pratensis*. Infrequent on Hirta and Dun, commonest at Na Mulichean Mor.

Rock-Pipit *Anthus spinoletta*. Hirta and Dun. The commonest land bird.

Pied Wagtail *Motacilla alba*. One at the Manse, 4th and 9th August.

Grey Wagtail *Motacilla cinerea*. One Gleann Mor, 3rd August. One in the Village, 4th August.

Starling *Sturnus vulgaris*. Wandering flocks of up to two hundred on Hirta and Dun, mostly immature birds. The 1931, 1939 and 1947 expeditions reported an increase in the population, and it is clear that this is being maintained.

Twite *Carduelis flavirostris*. Hirta and Dun. Very local, centred on Ruaival, Oiseval, Gleann Mor and the sea cliffs below Mullach Bi.

Discussion

The most interesting records are certainly those of the kestrels. They have previously been recorded by MacGillivray (1840), who states that they breed in the precipices in small numbers; and by Wilson (1842), who also includes it as a breeding bird for 1841. Dixon (1885), Clarke (1912) and Buchan, Harrison and Lack (1932) record only individual

birds which were probably on passage. A search was made for kestrel pellets on Glacan Oiseval, but none were found. The diet must be restricted, although suitable food is plentiful. Pipits, wrens, starlings and snipe could all contribute to the bird-prey, but the only mammal is the St. Kildan field-mouse *Apodemus sylvaticus hirtensis*.

Also of interest is the absence of peregrines (two pairs in 1931 and 1939), which is difficult to account for. Had they been present we would certainly have seen them. Three different individual carrier pigeons frequented the area round the manse. One of these had been left by a party of yachtsmen three weeks before our arrival. If peregrines had also been present on the island it is certain that the pigeons would not have survived long.

Another bird that was specially looked for and not found is the lesser black-backed gull. Fisher records fifteen pairs in the Great Glen in 1947, though only three birds were seen in 1939.

The decline in wheatears noticed by Nicholson and Fisher in 1939 has continued, and we found no evidence of breeding.

That there should be a single corncrake in 1938 (Atkinson), in 1939 and again in 1952, on each occasion in the same place, is certainly peculiar, and one wonders if it could be the same individual.

The records of wagtails, swallows, curlews, sanderlings, ringed plovers, black-headed gulls and lapwings are of interest as they provide further evidence of an early autumn migration similar to that found by the 1931 expedition.

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THE SHEEP POPULATION OF HIRTA, ST. KILDA, 1952 *

J. Morton Boyd
Glasgow

During a summer expedition to St. Kilda in 1952, a quick population study of the wild sheep was made, and a comprehensive census was taken.

Before considering the situation as we found it in 1952, it will be useful to recall in brief the history of the sheep flocks on Hirta, the largest island of the group. The early inhabitants kept a breed of sheep regarded by Professor James Ritchie (1920) as an early stage in the domestication of the wild mouflon *Ovis musimon*. It is from this breed that the Soay sheep of the present day are directly derived, and although the date of their introduction to St. Kilda is unknown, it is probable that they were established by the Norsemen. Since that time, however, a pure stock of these sheep has remained intact on the Isle of Soay at the north-west corner of Hirta, and separated from it by an impassable gulf of sea and cliff. They are therefore living survivors of the domesticated breed of a thousand years ago.

Later there arrived in the Hebrides from the east more improved types of sheep, which were introduced into Hirta by the lairds of St. Kilda to enhance the stock. None of those ever reached Soay, but by the time of the human evacuation in 1930 blackface was the dominant strain on Hirta and Boreray. At this time attempts were made to take the entire sheep population away from Hirta, but Dr. Fraser Darling and Mr. A. G. Ferguson inform me that several escaped the shepherds. Among these was at least one blackface whose characters are probably in the present stock. Mr. Ferguson also witnessed the introduction into Hirta, by the present laird, of 107 Soays from the Isle of Soay in 1932, and the proportions of this flock were about 20 tups, 44 ewes, and 43 lambs, of

* *Received* 10*th March* 1953

which 22 were wethers and 21 ewe lambs. An expedition in 1948, Mr. James Fisher tells me, recognised some of those wethers with their knob horns still alive sixteen years afterwards. The date given by Poore and Robertson (1949) for the introduction of this flock as 1931 is in error.

During the following years St. Kildans returned to the islands to attend to the flocks both on Hirta and Boreray. It is recorded (Fisher, 1948) that in 1937 no blackface remained on Hirta, the population being presumably entirely Soay. According to the present laird, the Marquess of Bute, Hirta had a population of about 500 sheep in 1939, but during the war years no watch was kept, and it was not until Fisher returned in 1947 that the next estimate of the population was made. No systematic census was taken by this expedition, but a rough figure of between 400 and 450 is given. In the following year Darling's expedition counted between 650 and 700, but Dr. Darling tells me that no comprehensive census was made with the combined efforts of the whole party. It would appear that in recent years little attention has been given to the Soay population on the Isle of Soay or the unkept blackface on Boreray. On one occasion in July 1952, however, I counted about sixty sheep on Soay, from the cliff tops of the Cambir on Hirta, and Mr. T. B. Bagenal, a member of the 1952 party, saw large numbers of sheep grazing the steep southern pastures of Boreray a few weeks before that time.

The latest census we carried out on 5th August 1952. Six members of the party took part, and starting from Am Blaid, paired off to cover three different sections of the island. We took great care to watch the passage of sheep from one section into the next, making note of the time of entry and size of flock, and after the operation was complete compared notes. Party 1, consisting of Dr. D. T. Gauld and J. Kirkland, covered Mullach Geal, Mullach Mor, Conachair, Oiseval, and the village area. Party 2, consisting of T. B. Bagenal and J. H. Connell, covered Mullach Bi, Gleann Mor, and the Cambir. Party 3, consisting of Professor W. Fisher Cassie and myself, covered Ruaival, Na h-Eagan, Leathaid a' Sgithoil Chaoil, Mullach Sgar, Creagan Dubh, and Creagan Breac. Party 1 counted 338, Party 2 counted 563, and Party 3 counted 213, to give a grand total of 1,114.

Owing to the lack of accurate information regarding the Hirta flocks since the introduction of the 107 individuals from Soay, and to the gap of the war years when no naturalists visited the island, a reliable picture of the build up of the population cannot be obtained. From the figures available, however, it would appear that numbers have been increasing at a fairly steady rate, and that in the space of twenty years, in the absence of predators, the population has become ten times as large as the original flock. In their present strength the sheep are grazing the grasslands smooth in all parts of the island, except in the village area, and it would appear that numbers are approaching what might well be the island's carrying capacity.

Contrary to expectations, the increase in numbers has not meant the gross overgrazing of the pastures around the village, and this may be due to the presence of humans during the summer. Indeed, the meadows have a luxuriant Agrostis-Festuca-Anthoxanthum complex, which provides suitable cover for such birds as the snipe *Gallinago gallinago*. These birds, reduced to two pairs in 1947, had perhaps increased to four pairs in 1952. Starlings *Sturnus vulgaris* attend the sheep flocks throughout the island. In 1947 there were at least fifty pairs, while in 1952 an estimate of about 200 to 250 flocking starlings is fairly accurate.

The carcases of dead sheep were never in evidence on the hillsides, mainly because they seem to die in " cleits ", which are small stone cells situated in great numbers throughout the island, and built by the St. Kildans to store crops, fuel, food, and gear. As a result the " cleits " are littered with the remains of sheep which have not been molested by crows. There is little doubt that in 1952 there were three pairs of hooded crows *Corvus cornix*, and probably four pairs of ravens *Corvus corax*.

The distribution of the sheep follows roughly the geological outlines of the island. Party 1 counted sheep on the pastures underlain by the acid granite (granophyre), and parties 2 and 3 on the pastures underlaid by the basic gabbro (olivine eucrite), with 11·18 per cent. CaO, and breccia (Cockburn, 1935). Although the area covered by party 1 is approximately equal to that covered by parties 2 and 3 added

together, the latter counted 77 per cent. of the population. From figures which Mr. Fisher has sent me of his 1947 count, I find that he saw about 70 per cent. on the basic grasslands, and a quarter of the total population was found on Ruaival alone in 1948 (Poore and Robertson, 1949). The grazing effect is due to sheep alone, there being no rabbits or hares.

Present in the Hirta flocks are individuals of light brown fleece-colour, white face, hornless, etc. I sampled the flocks to ascertain the proportions of light brown individuals. It emerged that 22·9 per cent. of the population was of the light strain, and an analysis of the chance distribution of those throughout the flocks showed them to be randomly distributed.

St. Kilda presents many superb problems in plant and animal ecology, and none would be more repaying than a study of the wild sheep. The first step would be to catch and mark a large number of individuals, and then the door would be open for a detailed study of the social structure of the flocks, the reproductive rate, the life history of the animal, and reciprocal factors of the eco-system. These sheep are one of the few populations of large wild mammals which the country possesses, and deserve further attention.

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THE MARINE FAUNA AND FLORA OF ST. KILDA, 1952 *

D. T. Gauld, T. B. Bagenal and J. H. Connell

The Marine Station, Millport, and Glasgow University

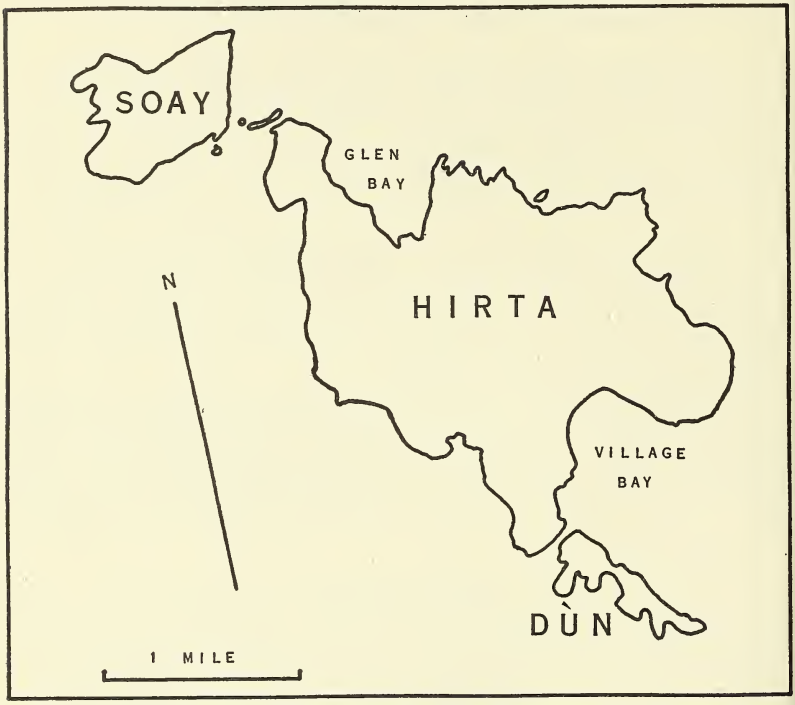
Although the natural history of St. Kilda has been studied in considerable detail, the marine fauna and flora have received very little attention apart from records incidental to other investigations (Evans 1906, Hewitt 1907). We are therefore grateful to the Marquess of Bute for permitting a party which we were invited to join to visit the islands during July and August 1952 when we made as good a survey of the marine biology as conditions allowed. The party lived on Hirta and landed on Dun on several occasions but was not able to visit any of the other adjacent islands or stacks.

It was possible to survey on the ground or from a rowing boat two miles of the shore of Village Bay from Rudh Challa (Map 2) to the eastern point of Dun, but elsewhere the only place where the shore was reached was Glen Bay on the north side of Hirta.

Village Bay is $\frac{3}{4}$ of a mile across and faces east-south-east. It is bounded to the north by the cliffs of Oiseval which, while 100 feet high at Rudh Challa, change to flat shelving rocks at Tobar a'Chleirich and these extend for 200 yards as far as the pier. West of the pier the rocks give way to large boulders which gradually become smaller and merge with the high storm beach which rises some 15 feet above H.W.O.S.T. This storm beach extends round the head of the bay where it rises abruptly at high water mark from a sandy shore some 300 yards long and 50 yards broad at low tide. Buchan, who was the minister there for many years, says (1773) : " There is plain sand at the head of this bay, to be seen in summer only ; the sea in winter washing it off the stones." At its north-east end the boulders are 3 feet or more in diameter and are composed of a light coloured granophyre. After a short transition belt near the mouth of Amhuinn Mhor they

* *Received 17th December* 1952

give way to smaller and darker-coloured dolerite boulders, reflecting the change in the solid geology. As the ground begins to rise on the south-west side of the bay the boulders again begin to cover the intertidal region, and here they tend to be very large with, even at low tide, deep water between

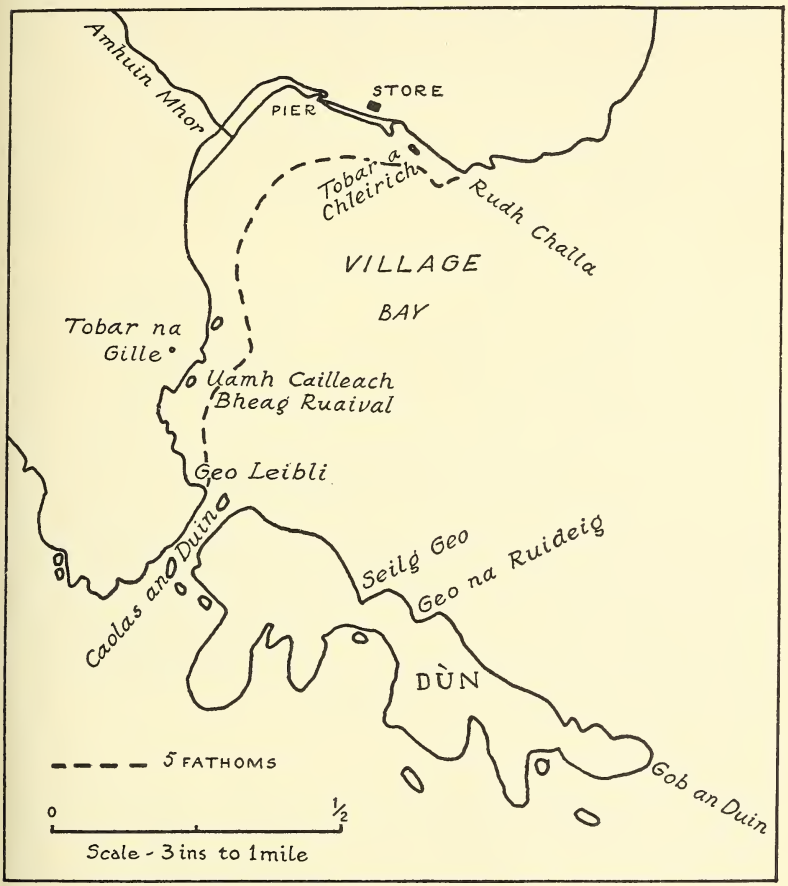


Map 1.—Rest of the St. Kilda Group.

them. These large boulders merge into a steeply sloping shore of the parent rock as far as Caolas an Duin. However, since the shore between Uamh Cailleach Bheag Ruaival and Geo Leibli is very broken we were unable to make our way along the shore and steep cliffs of drift prevented access from the land. The only place where the shore could be reached on this part of Hirta was in Caolas an Duin.

On Dun the shelving rocks of the north shore are easily traversed nearly as far as Seilg Geo where the steep cliffs which form the rest of the north coast of Dun begin. Seilg Geo is a deep narrow cave, formed by the erosion of a dyke, which it

was possible to penetrate for about 50 feet in a rowing boat, and Geo na Ruideig a little further along the shore is a second much wider cave which we examined.



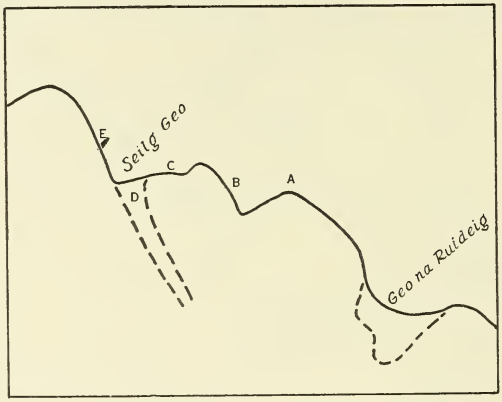
Map 2.—Village Bay, Hirta.

In Glen Bay, apart from a short stretch of shelving rocks at the head of the bay, most of the shore is precipitous and inaccessible. The shore was reached by members of the party at the tunnel, Geo na h'Airde, and at Mol Carn na Liana, but no important observations were made.

Elsewhere the shore was precipitous and inaccessible and observations could only be made from the cliff tops at a considerable height.

Zonation on the Rocky Shores

The zonation all round the island was remarkably uniform; it was only in Village Bay and Glen Bay that variations occurred. Large algae other than *Alaria* and *Porphyra* were



Map 3.—Part of North side of Dun.

rare and the only obviously numerous animals were barnacles, mussels and limpets; these are features associated with exposure to severe wave action. The observations appear to fit the scheme proposed by T. A. and A. Stephenson (1949) and the changes observed with different exposure and aspect will be considered in relation to their paper.

1. *The Sub-littoral Fringe*

On the exposed rocky shores extending round most of the island, 5 or 6 feet of this zone was the lowest that could be seen at L.W.O.S.T., characterised by *Lithothamnion*-encrusted rocks more or less covered by *Alaria*. Except for the presence of sponges and *Sagartia* in suitable holes and crannies, the only plentiful animal found was *Calliostoma*.

With less exposure, found only in Village Bay, there was an extensive development of *Laminaria cloustonii* with only a narrow fringe of *Alaria* above. It is not definitely known if the *Laminaria* was absent elsewhere and only locally replacing the *Alaria* in the lower part of the zone, or whether the *Laminaria*, permanently submerged and out of sight round the rest of the

island, extended into the littoral region in Village Bay; detailed observations round Seilg Geo do suggest this latter alternative. In area A (Map 3) *Alaria* only was visible, but towards area B *Laminaria* appears sublittorally, emerging at the western end of this face, and in area C replaced the *Alaria* completely. In Seilg Geo (area D) there were no algae. In area E a fringe of *Alaria* appeared again above the *Laminaria* and became more extensive as the rocks became less sheltered. In Geo na Ruideig poorly developed *Alaria* was present on the western side and at the head of the cave, but not on the overhanging eastern side.

2. *The Mid-littoral Zone*

On exposed vertical rocks this zone consists of dense *Balanus balanoides* and among these some *Chthamalus stellatus* and, in its middle third, large numbers of small *Mytilus edulis*. On the slightly sheltered and sloping rocks below the store, in Caolas an Duin and at the head of Glen Bay the barnacles were more scattered, covering less than half the rock surface, and the proportion of *Chthamalus* was much larger. On the more sheltered Village Bay rocks *Gigartina stellata* formed dense patches; the more exposed Glen Bay rocks with similar slope had only sparse *Gigartina*.

The Stephensons (*loc. cit.*) defined the upper limit of the mid-littoral zone as the upper limit of barnacles in quantity. This would include, on the St. Kildan sheltered shores, a belt dominated by *Patella*, and also containing extensive patches of *Fucus vesiculosus*, mostly forma *evesiculosus* though the typical variety was occasionally found on the sheltered side of boulders.

3. *The Supra-littoral Fringe*

On the exposed shores above the barnacles was a zone of rock which was bare except for conspicuous *Patella vulgata* on whose shells was very often *Porphyra umbilicalis*. Where the *Patella* were absent, as in Glen Bay, the *Porphyra* extended as forma *laciniata* into the barnacles, indicating that *Patella* grazing determines its normal lower limit. *Patella* therefore occupies an anomalous position ; in the sheltered Village Bay it inhabited the mid-littoral zone, while with increasing

exposure it was able to occupy more and more of the supra-littoral region. This upward trend was also found with the *Porphyra* of Glen Bay where, as well as the downward extension already mentioned, the upper limit was raised several feet, probably by the waves surging up the sloping rocks, so that the total height was about 15 feet. Contrasted with this, in Village Bay the *Porphyra* was not nearly so extensive and with it was found *Fucus spiralis* (approaching forma *nana*) which, though quite abundant, was restricted to both sides of the beach.

Above the *Porphyra* was a zone of varying width, slightly brownish-green in colour caused by microscopic algae.

Discussion

The minor Glen Bay modifications of the typical exposed conditions are attributable more to the slope than to shelter and here, as in corners and geos where the swell ran higher up the rock, the upper limits of *Alaria*, *Lithothamnion*, and *Porphyra* were raised several feet. Village Bay, however, is considerably sheltered and exposed only to south-easterly gales ; the party was surprised how sheltered it was even with a strong easterly wind. The zonation modifications appear to be associated with this rather than the nature of the shore, as was well shown by the *Fucus* spp. Nevertheless the wave action must be considerable as *Laminaria digitata*, *Ascophyllum nodosum*, *Fucus serratus*, and *Pelvetia canaliculata* were not found. Floating fragments of *Ascophyllum* were often found in the bay and if the conditions were suitable it would probably have established itself. A similar chance for *Laminaria digitata*, *Fucus serratus*, or *Pelvetia* to colonise was not noticed, but the algal association present suggest that the conditions are too severe for these species. The exposure also reduced the numbers and variety of all but the sessile shore animals. The *Littorina* spp. in particular are of interest. Less than ten specimens of *L. littorea* were found, and *L. littoralis* never exceeded 5 mm. in length. On the other hand *L. neritoides* was abundant and ubiquitous, extending from above high water mark to become most abundant in the mid-littoral zone (cf. Evans 1947), perhaps associated with the lack of competition with the larger species which were unable to seek shelter in dead barnacles as could the *L. neritoides*. If correct, this explanation accounts for

the anomalous planktonic eggs of *L. neritoides* compared with the viviparity of *L. saxatilis*, usually found lower down the shore; the range of *L. saxatilis* was quite normal on St. Kilda. The scarcity of *Nucella lapillus* was very significant in view of the abundant available food supply.

The vertical range of *Chthamalus stellatus* was found to be anomalous and of very special interest. Instead of being restricted to a narrow band at the top of the shore and never extending below mid-tide level, as is usual in west Scotland (Moore and Kitching 1939), on St. Kilda in areas representative of the open coast *Chthamalus* was present from the middle of the supra-littoral fringe to the bottom of the barnacles at approximately L.W.O.N.T., being most abundant in the mid-littoral zone. In Glen Bay and Village Bay *Chthamalus* had a similar distribution, forming about 10 per cent. of the dense barnacle patches on mid-littoral vertical rocks, while on more horizontal faces where *B. balanoides* was less numerous, *Chthamalus* appeared unaffected by the slope, so that on nearly level surfaces it out-numbered the *Balanus*. The geographical distribution of *Chthamalus* has been associated with the influence of Atlantic water (Moore and Kitching 1939) and minimal winter temperature (Southward 1950, Kitching 1950), both of which might apply to its abundance on St. Kilda, and its notable downward extension can be correlated with its exposure to considerable wave action (cf. Hatton 1938, Hatton and Fischer-Piette 1932).

The Fauna of the Sandy Beach

The fauna in the sand of Village Bay, which was sampled by digging out squares of $\frac{1}{2}$ or $\frac{1}{4}$ metre side to a depth of 10 cm. and washing the sand through a 2 mm. sieve, was sparse and consisted of only four or five species. *Talitrus saltator* occurred under drift wood and in the sand at H.W.O.S.T. *Pontocrates arenarius*, *Marinogammarus pirloti*, and *Nephthys cirrosa* were found in the sand close to L.W.O.S.T. and the only animal that occurred in the middle part of the beach was *Eurydice pulchra*, which inhabited a fairly well defined zone just below mid-tide level. The numbers per square metre obtained in a transect from the base of the storm beach to L.W.M. are given in Table 1.

Table 1

Station	*Height below base of storm beach (metres)*	*Horizontal distance from storm beach (metres)*	*Eurydice No./square metre*
1	0·00	1	8
2	0·57	10	—
3	—	15	—
4	1·31	20	1,996
5	—	25	4,640
6	2·06	30	4,228
7	—	35	1,200
8	2·71	40	56
9	—	45	32
10	3·08	50	80
11	3·32	55	80

In order to find if the concentration of *Eurydice* extended the whole length of the beach, a series of stations 25 metres apart, and at the approximate level of Station 5 (Table 1) were sampled. The results of this transect are given in Table 2.

Table 2

Station	*Distance from north end of beach (metres)*	*Eurydice No./square metre*
a	25	5,456
b (Station 5)	50	3,904
c	75	5,168
d	100	4,784
e	125	4,640
f	150	2,624
	(Stream 17 metres South of St. f.)	
g	175	160
h	200	96
i	225	112
j	250	32
k	275	16

It is apparent that either *Eurydice* was much scarcer south of the stream, or else the main concentration was at a different level. In order to investigate this four short transects were made and the main concentration of *Eurydice* was found 10 metres higher up the beach south of the stream, where it was

also found that the water surface was 28 cm. below the sand surface, compared with 40 cm. below it at the same level to the north of the stream. There seems therefore to be some correlation between the level on the beach of the main concentration of *Eurydice* and the depth of the water surface below the sand. There was also a clear indication that there were many fewer *Eurydice* near the stream since the largest catch in a transect 5 metres from it was 32 per square metre.

It is remarkable that the intertidal fauna of the sandy beach to all intents and purposes contained the one species *Eurydice pulchra*, since the *Nephthys* and Amphipods at the bottom and the *Talitrus* at the top were merely an overlap of the faunas of the neighbouring regions. This paucity of species is probably associated with the character of the sand, as well as with exposure to wave action, particularly if, as Buchan says, the sand is not permanent. The grains were angular and jagged, so that although the sand was fine it did not pack closely and drained quickly. This could be clearly seen at low water when the stream disappeared before reaching the sea, and the water table at the top of the beach was a metre below the surface of the sand when the tide was out.

The Sublittoral Fauna

By means of small rectangular dredge (mesh size $\frac{3}{4}$ inch) it was found that the sand extended below L.W.O.S.T. to about the 5 fathom contour (Map 2) and its fauna consisted only of *Nephthys cirrosa* and *Portunus marmoreus*. Beyond the sand the bottom deposit appeared to be a shell gravel with a more varied fauna with abundant *Echinocyamus pusillus* and *Venus striatula*.

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ALGAL LIST

Compiled by H. T. Powell

Chlorophyceae

Ulva lactuca L.

Village Bay : in the more sheltered positions between Rudh Challa and Uamh Cailleach Bheag Ruaival, and in high level brackish pools below Tobar na Gille. Also on stones dredged from shell gravel.

Enteromorpha intestinalis (L.) Link

Village Bay: common in brackish pools below the store and below Tobar na Gille.

Enteromorpha compressa (L.) Grev.

Village Bay: common on shelving rocks wherever fresh water present, and in the pools below Tobar na Gille.

Glen Bay: abundant in similar situations at the head of the bay, and epiphytic on *Fucus inflatus* f. *distichus*.

Urospora penicilliformis (Roth) Aresch. (= *U. isogona* (Sm.) Batt.).

Glen Bay : associated with *Gigartina stellata;* also epiphytic on *Callithamnion arbuscula*, *Ceramium ciliatum*, and *Laomedea flexuosa*.

Chaetomorpha aerea (Dillw.) Kütz.

Village Bay: in the pools below Tobar na Gille.

Rhizoclonium implexum (Dillw.) Kütz.

Village Bay: growing on *Corallina officinalis* in pools.

Acrosiphonia centralis (Lyngb.) Kjellm. (= *Cladophora arcta* (Dillw.) Kütz.)

Village Bay and Glen Bay: common particularly in shallow pools and on rocks in the *Balanus balanoides* zone.

Phaeophyceae

Ectocarpus fasciculatus Harv.
Glen Bay: epiphytic on *Petalonia fascia* in shallow pools at mid tide level; also epiphytic on *Fucus inflatus* f. *distichus*. With plurilocular sporangia, 25th July.

Giffordia secunda (Kütz.) Batt. (= *Ectocarpus secundus* Kütz.)
Village Bay: dredged from shell gravel. With plurilocular sporangia, 1st August.

Spongonema tomentosum (Huds.) Kütz. (= *Ectocarpus tomentosus* (Huds.) Lyngb.)
Village Bay, south side: epiphytic on *Fucus vesiculosus* f. *evesiculosus*.
Glen Bay: epiphytic on *F. inflatus* f. *distichus*.

Sphacelaria plumula Zanard
Village Bay: rare, on stone dredged from shell gravel. With numerous characteristic propagules.

Dictyota dichotoma (Huds.) Lamour
Village Bay, north side of Dun: rare.

Scytosiphon lomentaria (Lyngb.) Endl.
Village Bay: on boulders by pier.
Glen Bay: in shallow pools in lower part of barnacle zone.

Petalonia fascia (Müll.) Kuntze. (= *Phyllitis fascia* (Müll.) Kütz.)
Glen Bay: in shallow pool at mid tide level.

Elachista fucicola (Vell.) Aresch.
Village Bay: epiphytic on *Fucus vesiculosus* f. *evesiculosus* and *F. spiralis*.
Glen Bay: epiphytic on *F. inflatus* f. *distichus*.

Elachista scutulata (Sm.) Duby
Village Bay: epiphytic on receptacles of *Himanthalia elongata*. With unilocular sporangia, 24th July.

Leathesia difformis (L.) Aresch.
Village Bay: among *Gigartina stellata* on boulders on both sides of the bay.

Desmarestia ligulata (Lightf.) Lamour.
Village Bay, from Tobar a'Chleirich to Geo na Ruideig: among *Laminaria cloustonii* at low water level, and probably also sublittoral.

Laminaria cloustonii Edm.
Village Bay: from Tobar a'Chleirich to Geo na Ruideig: abundant below low water level.
Glen Bay: one small plant in a pool; probably present below low water level.

Sacchorhiza polyschides (Lightf.) Batt. (= *S. bulbosa* (Huds.) La Pylaie.)

Village Bay: common among *Laminaria cloustonii*, particularly between large boulders on the south side of the bay.

Alaria esculenta (L.) Grev.

Present, usually in abundance, at low levels on all of the rocky coast.

Village Bay and Glen Bay: abundant, though less common in Village Bay where *Laminaria cloustonii* present.

Fucus spiralis L.

Village Bay: present from Tobar a'Chleirich to the rocks below Tobar na Gille ; most common on the rocks west of the pier. Rather short, narrow fronds, some approaching f. *nana* Kjellm. Mature conceptacles, July-August.

Fucus vesiculosus L.

Village Bay: a few plants in sheltered positions on both sides of the inner part of the bay. Mature conceptacles, July-August.

Fucus vesiculosus L. f. *evesiculosus* Cotton.

Village Bay: present from Tobar a'Chleirich to Caolas an Duin; common, especially in the inner parts of the bay. Mature conceptacles, July-August.

Fucus inflatus L. f. *distichus* (L.) Börg.

Glen Bay: a few well-grown plants at the top of the *Balanus balanoides* zone, and a few small plants in a trickle of fresh water. Some plants had ceased fruiting; others still bore a few mature receptacles (hermaphrodite), 25th July.

[*Ascophyllum nodosum* (L.) Le Jol. No attached plants, but a few drifting fragments (one with *Lepas* spp. attached) found in Village Bay.]

Himanthalia elongata (L.) S. F. Gray. (= *H. lorea* (L.) Lyngb.).

Village Bay: present from Tobar a'Chleirich to Seilg Geo in *Balanus balanoides* zone; especially common at the pier. Mature conceptacles, July-August.

Rhodophyceae

Bangia fuscopurpurea (Dillw.) Lyngb.

Glen Bay: traces only; mixed with filaments of *Urospora penicilliformis*, also epiphytic on *Laomedea flexuosa*.

Porphyra umbilicalis (L.) Kütz.

Present, usually in abundance, on all of the rocky coast.

Village Bay and Glen Bay: abundant from above high water level, downwards into the barnacle zone where the plants approach f. *laciniata*. Also epiphytic on *Fucus vesiculosus* f. *evesiculosus* and *F. inflatus* f. *distichus*.

Porphyra umbilicalis (L.) Kütz. f. *laciniata* (Lightf.) J. Ag.

Village Bay and Glen Bay: abundant in barnacle zone; often associated with *Gigar tina stellata* or *Enteromorpha compressa.*

Porphyra miniata (Lyngb.) Ag.

Glen Bay: one plant found in lower part of barnacle zone.

Conchocelis rosea Batt. (= phase in life-history of *Porphyra umbilicalis* (L). Kütz. (Drew, 1949).)

Village Bay: well developed on inner surface of dead shells of *Cyprina islandica*, dredged from shell gravel.

Scinaia furcellata (Turn.) Bivona.

Village Bay: very rare. One plant only (7·2 cm. long) on a stone dredged from shell gravel. A few immature cystocarps on lower parts of plant, 1st August.

Gelidium crinale (Turn.) Lamour.

Village Bay, below the store: in *Gigartina stellata* zone.

Epilithon membranaceum (Esper) Heydr.

Village Bay: commonly epiphytic on *Gigartina stellata.*

Lithophyllum corallinae (Crn.) Heydr.

Village Bay: epiphytic on *Corallina officinalis.*

Corallina officinalis L.

Village Bay and Glen Bay: very common, particularly in *Lithothamnion* and barnacle zones, and in pools.

Callophyllis laciniata (Huds.) Kütz.

Village Bay, north side of Dun.

Meredithia microphylla J. Ag.

Village Bay, north side of Dun: on rocks at low water level. One plant only (5·1 cm. long), with small, immature cystocarps sunk in the thallus, 1st August.

Cruoria pellita (Lyngb.) Fries.

Village Bay and Glen Bay: very common in *Gigartina stellata* zone.

Gigartina stellata (Stackh.) Batt.

Village Bay: locally very common.

Glen Bay: common in barnacle zone. With young cystocarps, 24th July.

Rhodymenia palmata (L.) Grev.

Village Bay: abundant on stipes of *Laminaria cloustonii;* common on the rocks, and forming an extensive community in the *Patella* zone in a sheltered position near Tobar na Gille.

Glen Bay: on rocks in the *Balanus balanoides* zone.

Lomentaria articulata (Huds.) Lyngb.

Village Bay, in Geo na Ruideig.

Lomentaria clavellosa (Turn.) Gaill.

Village Bay, north side of Dun: in *Lithothamnion* zone. Both cystocarpic and tetrasporic plants, 1st August.

Lomentaria rosea (Harv.) Thur.

Village Bay: several plants on dead shells of *Cyprina islandica*, dredged from shell gravel. With tetraspores, 1st August.

Antithamnion plumula (Ellis) Thur.

Village Bay: on stones and dead shells of *Cyprina islandica*, dredged from shell gravel. With cystocarps, 1st August.

Ceramium ciliatum (Ellis) Ducluz.

Glen Bay: in a small pool in *Balanus balanoides* zone. With tetraspores, 25th July.

Ceramium acanthonotum Carm. ex. Harv.

Village Bay and Glen Bay: common on rocks, and epiphytic on *Corallina officinalis* in small pools, in the barnacle zone. With tetraspores, 31st July.

Ceramium rubrum (Huds.) Ag.

Village Bay: on the rocks and in small pools in the barnacle zone; with tetraspores, 24th July.

Glen Bay: epiphytic on *Gigartina stellata.*

Ptilota plumosa (L.) Ag.

Village Bay: very common on stipes of *Laminaria cloustonii.*

Callithamnion arbuscula (Dillw.) Lyngb.

Village Bay and Glen Bay: on exposed rocks, in *Balanus balanoides* zone and in small pools in *Lithothamnion* zone.

Cryptopleura ramosa (Huds.) Kylin.

Village Bay: on boulders, and near low water level on the north side of Dun. Also dredged from sublittoral. Mature cystocarpic and tetrasporic plants, 24th July.

Polysiphonia urceolata (Dillw.) Grev.

Village Bay: on rocks in the *Gigartina stellata* zone. Some plants with cystocarps, 24th July.

Pterosiphonia parasitica (Huds.) Fkbg.

Village Bay: rare. A few small plants dredged from shell gravel.

FAUNAL LIST

Porifera

Leucosolenia coriacea (Montagu)

Village Bay: intertidal below boulders, and common below L.W.M. particularly under *Himanthalia* buttons.

Sycon coronatum (Ellis and Solander)

Village Bay: intertidal below boulders, and common below L.W.M. among *Laminaria.*

Grantia compressa (Fabricius)
Village Bay: not uncommon below intertidal boulders, and among *Laminaria*.
Halichondria panicea (Pallas)
Village Bay: abundant above and below L.W.M. in sheltered positions and particularly extensive in caves.
Glen Bay: common in cracks and sheltered positions, though absent from pools.
Hymeniacidon sanguinea (Grant)
Village Bay: less abundant intertidally than *Halichondria* but as common below L.W.M. and also extensive in caves.
Glen Bay, in intertidal pools.

Coelenterata

Hydrozoa

Coryne pusilla Gaertner
Village Bay: only in caves intertidally.
Coryne fruticosa Hincks
Glen Bay: in intertidal pools.
Tubularia indivisa L.
Village Bay: below boulders and in caves.
Glen Bay: below overhanging rocks.
Corymorpha nutans M. Sars
Village Bay: on dead shell dredged from shell gravel.
Obelia geniculata (L.)
Village Bay: below boulders.
Glen Bay: in intertidal pools.
Laomedea flexuosa Hincks
Village Bay: on *Gigartina* from north side of Dun.
Glen Bay: on *Scytosiphon* in Balanus zone.
Dynamena pumila (L.)
Village Bay: below boulders on *Gigartina* and in the caves.
Aequorea forskålea (Péron & Lesueur)
Village Bay.

Scyphozoa

Lucernaria campanulata Lamouroux
Village Bay: on red weed growing on *Laminaria* stipes.
Cyanea capillata (L.)
Village Bay and south coast.

Anthozoa

Alcyonium glomeratum (Hassall)
Village Bay: Seilg Geo, at and below L.W.M.
Actinia equina L.
Village Bay: abundant in barnacle zone.
Glen Bay: in pools and sheltered places.
Sagartia elegans (Dalyell)
Village Bay: very abundant among *Laminaria* and in cracks, pools and other sheltered positions.
Glen Bay: in cracks and pools.
Corynactis viridis Allman
Village Bay: abundant among *Laminaria* and in Seilg Geo.

Ctenophora

Bolinopsis infundibulum (O. F. Müller)
Village Bay.
Pleurobrachia pileus (O. F. Müller)
Village Bay.
Beroë cucumis Fabricius
Village Bay.

ANNELIDA

Polychaeta

Nereis pelagica L.
Village Bay: In *Laminaria* holdfasts.
Nephthys cirrosa Ehlers
Village Bay: in sand from L.W.M. to *c.* 5 fathoms.
Nephthys paradoxa Malmgren
Village Bay: one.
Owenia fusiformis Delle Chiaje
Village Bay: abundant, dredged from shell gravel.
Hydroides norvegicus Gunnerus
Village Bay: on a shell dredged from shell gravel.
Spirorbis borealis Daudin
Village Bay: on the underside of *Himanthalia* buttons.

CRUSTACEA

Copepoda

Tigriopus fulvus (Fischer)
Village Bay: in *Enteromorpha* pools above H.W.M. east of the pier.

Cirripedia

Lepas anserifera L.
Village Bay: attached to a drifting piece of *Ascophyllum nodosum.*
Lepas fascicularis Ellis and Solander
Village Bay: attached to the same piece of *Ascophyllum* as above.
Verruca stroemia (O. F. Müller)
Village Bay: on the south side under boulders.
Chthamalus stellatus (Poli)
Village Bay: abundant.
Glen Bay: abundant.
Balanus balanoides (L.)
Village Bay: abundant.
Glen Bay: abundant.

Isopoda

Eurydice pulchra Leach
Village Bay: abundant in the shore sand.
Idotea pelagica Leach
Village Bay: among *Laminaria.*
Idotea granulosa Rathke
Village Bay: among *Laminaria* and *Gigartina.*
Idotea neglecta G. O. Sars
Village Bay: among *Laminaria* and swimming off the sand at L.W.M.
Jaera marina (Fabricius)
Village Bay: below stones.
Ligia oceanica (L.)
Village Bay: in cracks and under stones in the *Porphyra* zone and from H.W.M. to 15 feet.

Amphipoda

Euthemisto compressa (Goës)
Village Bay: common.
Euthemisto bispinosa (Boeck)
Village Bay: common.
Stenothoë monoculoides (Montagu)
Village Bay: in *Laminaria* holdfasts.
Pontocrates arenarius (Bate)
Village Bay: common in the sand near L.W.M.
Apherusa jurinei (Milne-Edwards)
Village Bay: abundant in *Laminaria* zone.
Maera othonis (Milne-Edwards)
Village Bay: dredged from shell gravel.

Gammarellus homari (J. C. Fabricius)
Village Bay: in *Laminaria* zone.
Marinogammarus pirloti (Sexton and Spooner)
Village Bay: in sand near L.W.M.
Gammarus locusta (L.)
Village Bay: in the *Laminaria* zone.
Talitrus saltator (Montagu)
Village Bay: under all kinds of objects at and about H.W.M., and also found under slates near the manse door.
Hyale nilssoni (Rathke)
Glen Bay: in pools in upper barnacle zone.
Hyale pontica (Rathke)
Village Bay: abundant in *Laminaria* zone.
Hyale perieri (Lucas)
Village Bay: in *Laminaria* zone. Glen Bay: in shore pools.
Aora typics Kröyer
Village Bay: dredged from the shell gravel.
Amphithoë rubricata (Montagu)
Village Bay: in *Laminaria* zone.
Jassa falcata (Montagu)
Village Bay: in *Laminaria* zone.
Janassa capillata (Rathke)
Village Bay: on the south side among *Gigartina* on boulders.
Glen Bay: in a shore pool.
Autonoë websteri (Spence Bate)
Village Bay: in *Laminaria* zone.

Decapoda

Galathea strigosa L.
Village Bay: one juvenile dredged from shell gravel.
Eupagurus bernhardus (L.)
Village Bay: one dredged from shell gravel.
Portunus marmoreus Leach
Village Bay: common on the sublittoral sand and one dredged from the shell gravel.
Portunus depurator (L.)
Village Bay: one dredged from near the pier.
Carcinus maenas (Pennant)
Village Bay: only one found, among boulders on north side.
Cancer pagurus L.
Village Bay: only three found, two juveniles in *Laminaria* below the store and the third among boulders on the south side.

Pycnogonida

Pycnogonum littorale (Stroem)
Village Bay: on clinker dredged from the shell gravel.

Insecta

Lipura maritima Guerin
Village Bay: on pools.
Glen Bay: on pools.
Petrobius maritimus Leach
Village Bay: under stones from H.W.M. up to 800 feet.

Mollusca

Lamellibranchiata

Mytilus edulis L.
Village Bay: abundant among barnacles and in cracks on the more exposed rocky shores, and a few on boulders.
Glen Bay: numerous in *Lithothamnion* zone.
Modiolus modiolus (L.)
Village Bay: juvenile in Seilg Geo at L.W.M.
Cyprina islandica (L.)
Village Bay: one dredged from shell gravel.
Lasaea rubra (Montagu)
Village Bay: common among byssi of *Mytilus* in Caolas an Duin.
Dosinia exoleta (L.)
Village Bay: dredged from the shell gravel.
Venus striatula (da Costa)
Village Bay: dredged from the shell gravel.
Cardium echinatum L.
Village Bay: dredged from the shell gravel.
Cochlodesma praetenue (Montagu)
Village Bay: one dredged from shell gravel.

Gastropoda

Patella vulgata L.
Village Bay: abundant.
Glen Bay: abundant.
Patina pellucida (L.)
Village Bay: abundant on *Laminaria.*
Patelloidea tessulata (Müller)
Village Bay: on *Laminaria.*
Margarites helicinus (Fabricius)
Village Bay: among *Laminaria.*
Gibbula cineraria (L.)
Village Bay: among boulders.

Calliostoma zizyphinum (L.)
Village Bay: abundant in *Lithothamnion* and *Laminaria* zone.
Littorina littoralis (L.)
Village Bay: small individuals not uncommon.
Littorina neritoides (L.)
Village Bay: abundant in cracks and dead barnacles.
Glen Bay: as in Village Bay.
Littorina saxatilis (Olivi)
Village Bay: abundant in upper part of shore.
Glen Bay: abundant in cracks.
Littorina littorea L.
Village Bay: very few on boulders, one below the store.
Glen Bay: very few small ones.
Aporrhais pes-pelecani (L.)
Village Bay: one dredged from shell gravel.
Nucella lapillus (L.)
Village Bay: uncommon, found on boulders and below the store but not on vertical rocks.
Archidoris britannica (Johnston)
Village Bay: not uncommon among boulders and in the caves.

Cephalopoda

Eledone cirrosa (Lamarck)
Village Bay: one cast up near the pier.

Bryozoa

Scrupocellaria reptans (L.)
Village Bay: on a fragment of weed from shell gravel.
Scrupocellaria scruposa (L.)
Village Bay: on shell dredged from shell gravel.
Bugula flabellata J. E. Gray
Village Bay: on stone and shell dredged from shell gravel.
Membranipora lineata (L.)
Village Bay: on *Laminaria* stipes and holdfasts.
Membranipora pilosa (L.)
Village Bay: on *Ptilota* among *Laminaria*; on *Gigartina* from Dun.
Umbonula verrucosa (Esper)
Village Bay: under boulders on south side of bay and in Seilg Geo at L.W.M.
Schizoporella hyalina (L.)
Village Bay: on *Laminaria* holdfasts.
Cellopora costazii Audouin
Village Bay: in Seilg Geo at L.W.M. and on *Gigartina* from Dun.

Stomatopora granulata (Milne-Edwards)
Village Bay: on a fragment of weed from shell gravel.

Echinodermata

Henricia sanguinolenta (O. F. Müller)
Village Bay: Seilg Geo at L.W.M.
Asterias rubens L.
Village Bay: Seilg Geo at L.W.M.
Marthasterias glacialis (L.)
Village Bay: Seilg Geo at L.W.M.
Ophiothrix fragilis (Abildgaard)
Village Bay: dredged from shell gravel.
Ophiopholis aculeata (L.)
Village Bay: found in *Laminaria* holdfasts.
Ophiura albida Forbes
Village Bay: dredged from shell gravel.
Ophiocten scutatum Koehler
Village Bay: dredged from shell gravel.
Echinus esculentus L.
Village Bay: found among *Laminaria* between boulders and in Seilg Geo.
Echinocyamus pusillus (O. F. Müller)
Village Bay: dredged from shell gravel where it was abundant.

Tunicata

Salpa fusiformis Cuvier
Village Bay: one found on the sand, probably dropped by bird.

Pisces

Cetorhinus maximus (Blainville)
Village Bay: one.
Gastrosteus aculeatus L.
Village Bay: in a shore pool by Uamh Cailleach Bheag Ruaival.
Gadus merlangus L.
Village Bay: one found associated with *Aequorea*.
Blennius pholis L.
Village Bay: under boulder by pier.
Pleuronectes platessa L.
Village Bay: one juvenile in shore seine.
Pleuronectes limanda L.
Village Bay: one juvenile dredged from shell gravel.
Scomber scombrus L.
Village Bay: very abundant, caught by shore seine and lines.

ZOOLOGICAL NOTES

The crab *Xantho incisus* in Eriskay Sound.—On 17th February 1953 being held up by an exceptionally low tide at Ludag, South Uist, on my way to Eriskay, I took the opportunity to look for crabs and lobsters under stones on the shore of a small tidal island, Corr-eilein, near Ludag. While engaged in this I found a considerable number of specimens of *Xantho incisus*, a crab which I had only seen at one or two places on the shore of Canna before.—J. L. Campbell, Isle of Canna.

Two species of *Calliphora* from the Aberdeen district.—The genus *Calliphora* (" bluebottles ") as given in C. D. Day's book, *British Tachinid Flies*, consists of four species. Two of these, *C. erythrocephala* Mg. and *C. vomitoria* L., are the common varieties which haunt our larders. Of the other two species, *C. loewi* Ender is noted as " Uncommon, North of Scotland ", and *C. uralensis* Villen as " Rare, Sutherland ".

I took the former in 1949 at Cults, and again in 1950 at Old Deer, and a species of Calliphora which I took on the coast just south of Aberdeen in September 1952 has been identified by Dr. Day as *C. uralensis* Villen. These two species, both of which have black hairs on black jowls, are distinguished from one another by the width of the frontal stripe, and by the shape of, and extent of hair on, the paralobes.—E. G. H. Lightfoot, Aberdeen.

Shetland Offshore Visitors.—Many interesting bird visitors come to Shetland offshore waters in the winter and spring months that are never seen by the landsman and are never recorded. A Ross's gull *Rhodostethia rosea* was caught by the Whalsay fishing skipper John Irvine between the island of Whalsay and the Out Skerries on 28th April 1936. This was a bird-in-the-hand, and was duly recorded, but Irvine told me of another that he had seen in the same area on 16th April 1935 and his brother mentioned one that had followed his boat for many miles on 18th December 1948. Knowing both men I have no hesitation in accepting these statements. Quite often in the winter months Irvine has informed me of large shearwaters which he had seen on the fishing grounds to the eastward of the island of Fetlar, some with white breasts and others all dark. These fishing grounds often swarm with little auks when only a rare one, and that a dying specimen, ever reaches the coast. On 27th December 1952 an Iceland gull *Larus glaucoides*

was seen at Lerwick, the only one recorded there during the winter to that date, yet Irvine had been seeing numbers of these gulls offshore amongst glaucous and other gulls ever since the month of October. It was clear that these fishing grounds would be worth visiting in the winter, and I was glad to accept an invitation from John Irvine to accompany him on a two day trip to the Fetlar grounds in his seine-net boat *Liberty*. A feature of seine-net fishing is that immediately after each drag the catch is gutted on deck and the offal thrown overboard, so that every vessel has a cloud of birds hovering over and following astern eagerly feeding on the rich spoils. On 8th January 1953 approximately ten miles east of the island of Fetlar the crew of the *Liberty* was busy gutting a ton of fish which had just been hoisted aboard while I had the interesting task of spotting the strangers to be seen amongst the two or three hundred herring and the great black-backed gulls and kittiwakes which were flying round and following astern. The most interesting of these was a sooty shearwater *Procellaria grisea* which was flying about quite close to the boat. Almost as large as a fulmar, but with rather narrower wings, this sooty-coloured, dark-breasted bird planed around us with typical shearwater flight, at times showing its underwings when the pale tract along the middle of each could be distinctly seen. Our bird did not dive or feed on anything, but I was later informed that the boat fishing a couple of miles south of us was followed by two birds of this species, and that both dived and fed on offal. It appears that this species and a " large white-breasted shearwater ", probably the great shearwater *Procellaria gravis*, are regular winter visitors to these fishing grounds. The Manx shearwater *Procellaria p. puffinus* is a summer visitor. The next of interest in our flock were five Iceland gulls. One of these was a beautiful adult with a much whiter head than one would have expected at this time of year. The others I classified as a fourth winter bird, a bird in its second winter and two in their first winter plumages. All five were noticeably smaller than herring gulls. Amongst the fifty or so fulmars was a bird of the dark phase, and whilst watching it feeding alongside I wondered if it could be the bird which has bred for two consecutive seasons at a spot less than twenty miles from where we were fishing. Of glacous gulls there were about a score; a mixture of all ages and all noticeably larger than herring gulls. A dozen gannets plodded behind us interested only in the undersized fish and pieces of offal which had sunk too deep for the gulls and which came in sight astern as the boat forged ahead. Three or four gannets at a time would plunge on these items, and

I noted that the offal seemed to be as acceptable to them as were the fish. Small pieces of fish liver were laid along the gunwale of the boat to discover which birds would have the fortitude to pick them off. All were interested and came within a yard or so, but only herring gulls and kittiwakes got the prizes. Perhaps the quick motion of the boat kept the others off. Little auks were conspicuous by their absence. Actually we did see one individual but it merely stressed the contrast between this winter and a normal one when so many of these birds are seen over the area. Shetland waters have been free of severe northerly gales during the winter to date and if these conditions have extended much further north such would probably account for the scarcity of this species.—G. T. Kay, Lerwick.

Common Scoter in St. Andrews Bay.—It is well known that large flocks of common scoter *Melanitta nigra* may be seen in summer at various points off our coasts, and for some years we have been making a special study of those that frequent St. Andrews Bay at that season.

This year (1952) on 18th June, we found a flock of about 200 in the Bay and watched a succession of small parties, of about twelve to twenty, coming in from north-north-east and pitching in the sea at a little distance from the original flock: two days later about 800 were present. This flock, which, as far as we could see, consisted entirely of drakes, remained throughout the summer, but, owing to stormy weather, we were unable to make as detailed observations as we had made the year before.

We were not fortunate enough to see their arrival in 1951 but, throughout July, there was an enormous flock which we estimated at about 3,000 birds; as far as we could see, all were drakes. In winter we find the scoter flocks restless; the birds are given to taking short flights, even in the calmest weather, and frequently flap their wings when on the water. In the summer flocks, on the other hand, we see no flying at all. On 16th August 1951 our notes run, " the great flock is still there, larger than ever. In addition to the huge numbers off the mouth of the Eden, there are small flocks close inshore all the way to St. Andrews. All that we could distinguish were drakes; they occasionally flapped, very feebly, but none flew." On 27th August we found " the huge flock still there, very closely serried today and more inclined to fly a bit. The birds all seemed to be drakes and were much blacker than heretofore, newly moulted, we think." On 5th September " there was no sign of the big scoter flock; there was

not a scoter to be seen". These observations have led us to the conclusion that these summer flocks are birds which come to St. Andrews Bay to moult and leave after the moult is completed.

On 26th September huge flocks again appeared but this time, in addition to drakes, there were also females and immature birds. Throughout the winter of 1951-52 common scoter were in St. Andrews Bay in very large numbers. They are always abundant there in winter, but this season they were more numerous than usual. Our note on 20th November runs "the scoter flock extended from the Eden to the Castle; there must have been thousands but the sea was much too rough to attempt a count". By 5th April the big flock had broken up but the sea was full of small parties, some obviously paired. By 11th May very few were left, and these were mostly drakes.—Leonora Jeffrey Rintoul and Evelyn V. Baxter, Largo, Fife.

I spent part at least of each summer in the six years 1934-39 on the shore of the Lower St. Lawrence, near Bic, Quebec, Canada; and there we had always some hundreds of scoters, chiefly surf scoters, but with varying numbers of both the other species. They arrived about mid-June (earliest date, 9th June 1935), and at that time consisted almost entirely of mature drakes. The noise of their wings, sounding like liquid poured from a bottle, carried far over the calm sea, especially at night, and was one of the most characteristic sounds of the place. They could all fly for several weeks after this, well into July; and even after the moult had begun there were always some birds able to fly. By the end of August, when we left Bic, females and young birds had begun to appear.

On 19th August 1937 near Nain, Labrador, I overtook in a motor boat a flock of 150 surf scoters, all drakes, and found that, though many were in full moult and flightless, others had by this time completed the wing-moult and could rise off the water. I collected and examined three specimens.

These observations are given here because they afford confirmation to those related in the important note above by Miss Rintoul and Miss Baxter. The existence for some sea ducks (such as the sheld-duck and king eider) of special moulting places, and of migratory movements to and from them, are only now being recognised.—V. C. Wynne-Edwards, Aberdeen.

On 11th September 1937 when sailing between the islands of Boreray and Berneray, Sound of Harris, I found a flock of 80-100 common scoter on the water. I know this stretch of sea well during the winter months, but, though there are sometimes a

few scoter here then, this is easily the largest number that I have ever seen in this part of the Sound. A few of the birds were unable to fly. The sea, which was dead calm at the time, was covered with very many of their moulted feathers.—James W. Campbell, Strathtay, Perthshire.

Common Scoters resting ashore.—On 30th October 1952, at about 6 p.m., after a violent storm in this area, we surprised five common scoter *Melanitta nigra* resting on marine grass at Sandyhills, on the Solway, at low tide. The sea goes out a very long way here, and the birds, which were asleep on an "island" cut off from the shore by a burn a few yards wide, were a greater distance from the open sea than we have ever seen them. They took little notice of us, though we were within twenty-five yards of them. The birds were not "oiled". Finally we saw one flying in from the sea; it planed down and joined the others. Outside the breeding season this species is said to be exclusively marine, and the presence of scoters on land in the manner described appeared to us to be abnormal.—David and Jane Bannerman, Boreland of Southwick, Kirkcudbrightshire.

J. G. Millais, in *British Diving Ducks*, Vol. 2, p. 58, writes: "Common scoters are said to rest occasionally on sandbanks (see Naumann), and I have heard this corroborated by gunners on the coast of Lincolnshire, but I cannot say that I have ever seen one ashore except in the breeding season."—Editors.

The Osprey in the North-East of Scotland.—In the early 1920s it was known, at least in certain intimate circles, that ospreys were being reared with protective supervision, presumably under the direction or inspiration of Capt. Knight, in woods by the river Deveron, near the line dividing the counties of Aberdeen and Banff.

Concrete evidence of the laudable venture first came to my notice twenty-eight summers ago when I was recovering from a serious physical breakdown—one which, I may add, in no way dimmed or distorted my good vision! I was staying less than half a mile from the Fedderate Reservoir, an artificial loch of twenty-five acres, christened Loch Riach, unofficially, but better known locally as the Broch Dam. This rather bleak anglers' haunt, constructed during the years 1910-12 to form the main water supply to the Burgh of Fraserburgh, is fed by two gentle streams from the western side of the Bonnykelly district, some five miles north of the village of New Deer.

From the last week of July, 1925, and during every morning for more than a fortnight, four ospreys—at least some of them obviously juveniles—came to the loch. Much of their time they spent calling, raucously and anxiously, from the tops of fencing posts on the adjoining croft, then tenanted by Mr. James Scott, since deceased. Mr. Scott's daughter Mary, now Mrs. Greig, 50 Academy St., Fraserburgh, witnessed them regularly at near range, but their penetrating, persistent cries certainly claimed the attention of other workers on the five neighbouring crofts. I, too, heard and saw the grand birds, and had the honour first to identify them there, but I had not quite regained the mobility to study their general behaviour from closer quarters. One forenoon in August, however, I followed them with a 2½-inch telescope, at a distance of fifty yards and upwards, as they flew from post to post in a south-easterly direction alongside the compensation water from the reservoir, until slowly and silently they passed from view. I did not see them again, and I cannot recall mention of their having been seen by anyone else during the remainder of that year.

From the latter half of the 1929 spring, moreover, one bird—presumably an adult, possibly a breeding bird—fished the loch. The daily spectacle of the pounce and plunge for the kill greatly excited the curiosity of the near, and even some of the more remote inhabitants. For landing its prey this bird appeared invariably to choose the same point of vantage—which I examined for possible " fishprints ", etc., when I returned to the scene early in July of that year—the top of a tall straining post, in the east corner of the nearest field on the Upper Oldwhat holding then farmed by Mr. William Willox. Mr. John Willox, his younger son, a keen sportsman and naturalist who now owns the Ythan Garage near Ellon, gave much of his leisure and more to studying this osprey and trying to dissuade the unscrupulous from harming it. The sad, despairing news, alas! reached him in late June that this noble, pioneering bird, which by then had ceased to distinguish the area with its presence, had been wantonly wounded by gunshot from the northern, Whitecairns side of the reservoir.

Readers will readily appreciate that the above is the first eyewitness account of the Loch Riach visiting ospreys to be published through any of the normal channels. I even withheld the details from the late H. F. Witherby and his world-famous *Handbook* in the interests of the species. As no subsequent occurrences of this rare fish-hawk have been observed in the district, however, I have been stimulated and persuaded by Professor V. C. Wynne-Edwards

to have these authentic records preserved in this eminently appropriate journal.—J. Murdoch Henderson, Aberdeen.

Sanderlings in South Inverness.—On 2nd September 1952 I saw two sanderlings (*Crocethia alba*) at the edge of the sea by the road between Arisaig and Mallaig. They were very tame, and I was able to photograph them.—James F. Butler, Reading, Berks.

Sanderlings have been recorded from North Argyll and West Ross, but we know of no previous record for South Inverness.—Editors.

Roseate Terns in Wigtownshire.—On 10th August 1952 there were two roseate terns *Sterna dougallii* fishing close inshore near Isle of Whitehorn.—H. G. Alexander, Birmingham.

The roseate tern does not appear to have been recorded previously from Wigtown.—Editors.

Kingfisher in Inverness-shire.—An unusual visitor to the Newtonmore district, during the hard spell in the latter half of November 1952, was a kingfisher *Alcedo atthis*, which was present from 16th to 30th November; this is the first I have seen in the Highlands.—Richard Perry, Newtonmore.

Hoopoe in West Sutherland.—A hoopoe *Upupa epops* was seen on 27th September 1952 by Colonel Gerald Grosvenor, who knows the bird well in India, on the stalking path at Lone, near the head of Loch Stack, Sutherland. The bird was very tame.—Seton Gordon, Duntuilm, Skye.

The hoopoe has been recorded as an occasional visitor in most of the Scottish faunal areas, but this appears to be the first occurrence for West Sutherland.—Editors.

Hoopoe pursued by a Merlin.—When walking along the Burn of Wirvie at the north end of Fair Isle on 15th October 1952 we were surprised to see a hoopoe *Upupa epops* flying about 200 feet above our heads. There was a female merlin *Falco columbarius* in close pursuit. Within five minutes the two had climbed so high that we lost sight of them moving to a better vantage-point, and were unable to pick them up again in our glasses. When first seen, the black and white patterning of the hoopoe's markedly rounded wings, its fawn body plumage and the long bill were diagnostic: it is a species we have both watched on a previous occasion on the island. This bird's tactics were to climb in a

tight spiral, and after the first few minutes it was clearly getting the better of the situation. Its broad, rounded wings gave it a better "lift", and it climbed with apparent ease, looking remarkably moth-like, whilst the merlin seemed unable to keep up with it except by making long, straight climbs which took it to a distance of many yards from its would-be quarry—so that each time it looked as though the falcon were giving up the unequal contest. In these straight climbs, however, the merlin apparently secured a temporary advantage of height, for at the end of each one it turned and swooped at the hoopoe, which seemed to have little difficulty in avoiding its dashes, however. Colonel R. Meinertzhagen tells us he has seen hoopoes adopt the same tactics successfully against Eleanora's falcons *Falco eleanorae* in eastern Mediterranean countries. For a recent record of a sparrow-hawk *Accipter nisus* capturing a hoopoe, see *British Birds*, 42: 24-25 (1949).

A few minutes after watching this encounter K. W. climbed the Ward Hill, and at one point put up a female merlin, but in all likelihood a different bird from the one we had been watching, since a search of the spot revealed some body and wing-feathers of a goldcrest (*Regulus regulus*). An interesting illustration of the remarkable range in size of the prey hunted by this small falcon! —Kenneth and Esther Williamson, Fair Isle Bird Observatory.

Wryneck in Inverness-shire.—On 25th May 1952 I heard a wryneck (*Jynx torquilla*) calling repeatedly near Glenmore Lodge, Inverness-shire, and eventually had first-class views of it at close quarters. It was very difficult to stalk, generally slipping away on the far side of the tree in which it had been calling. Its notes were repeated at regular intervals, and in the evening it was again heard in the same area. On 26th May it was again located by the characteristic notes.—Arthur J. Smith, Selkirk.

See *Scottish Naturalist* 64: 57 and 117 for previous records for Inverness-shire.—Editors.

Gathering of Long-tailed Tits in East Fife.—On the evening of 27th September 1952 about 5.15 p.m. at Cameron Reservoir, 600 feet above the sea, I had the pleasant experience of seeing a large congregation of long-tailed tits *Aegithalos caudatus*. They passed along the hedge-row and into the fir wood beside the reservoir. I counted seventy-seven, but a good many had passed before I began to count.—George Dall, Cameron Reservoir, St. Andrews.

Early arrival of Fieldfares.—On 2nd August 1952 between Taynuilt and Taycreggan, Argyll, my wife and I from our car had close views of a flock of nine to twelve fieldfares *Turdus pilaris* on the ground. When disturbed they flew off and up into nearby trees.

The earliest arrival date for the British Isles in the 1938 edition of Witherby's *Handbook* is 5th August.—J. Inglis Cameron, Glasgow.

Black Redstart in Caithness.—Mr. John R. Scott, principal lightkeeper at Dunnet Head, has sent me details of an adult male black redstart *Phoenicurus ochrurus* which appeared at the lighthouse on 23rd March 1952 and remained for three days about the lighthouse walls. The only previous record I can trace for Caithness was at Noss Head on 17th October 1919 (*Scot. Nat.*, 1920: 101). Ian D. Pennie, Golspie.

Blackcap in Skye in November.—On 18th November 1952, a male blackcap *Sylvia atricapilla* appeared at a window sill, where food is put out for birds, at the Boys' Hostel, Portree. The bird was first seen by Mr. Meakin, and later by Mr. Robertson. On 19th November I saw the bird on the window-sill, at a distance of 3 to 4 feet, in a reasonable mid-day light, and was able to confirm the identification. Blue, cole and great tits were feeding with it. The bird was not seen after 19th November, when the weather became milder. This is the first I have seen in Skye.—I. M. Murray, Portree.

The Geographical Distribution and Status of Birds in Scotland gives no record for Skye, nor have we so far found any in other publications. For records of some recent winter occurrences in Scotland see *Scottish Naturalist*, 64: 53-54.—Editors.

Lesser Whitethroat in Lewis, Outer Hebrides.—On 16th September 1951 our cat brought in a tattered whitethroat which I identified as a lesser whitethroat *Sylvia curruca*. I sent the bird to the Royal Scottish Museum, where my identification was confirmed. On 25th September 1951 I saw two more whitethroats in the garden here; as they looked rather greyish-brown on the back with dark ear coverts, I presumed that they also were lesser whitethroats. They were still in the garden on 26th September. I was on the lookout for whitethroats this spring, and on 15th May 1952 saw a bird in the garden which I considered was a lesser. On 16th May there was a common whitethroat *Sylvia communis*

here. I saw these two birds at close quarters, and the one seen on the 15th had ear coverts darker than the crown, whereas the other bird's head was of a greyish colour without any noticeable difference between the colour of the crown and the ear coverts.—Donald M. MacDonald, Upper Shader, Barvas, Lewis.

There have been previous records for the Outer Hebrides from Barra, St. Kilda, Flannans, North Uist and North Rona, but this is the first record we have for Lewis.—Editors.

Waxwing feeding on Apples.—On 21st and 22nd November 1952 a waxwing *Bombycilla garrulus* visited our garden and fed entirely on apples (left-overs for birds), although we have abundance of berries, Cotoneaster, yew, privet and blackberries. Apples are not included in the food of the waxwing in the *Handbook of British Birds*.—John Fraser, Oban.

On page 10 of Baxter and Rintoul's report, *The Migration of Waxwings into Scotland*, 1946 (Edinburgh: 1947), it is stated that waxwings were twice reported to have been observed feeding on apples during this migration. Apples are also mentioned as food of this species in Bent's *Life Histories of North American Wagtails, Shrikes, Vireos and their Allies* (Washington, 1950: 71).—Editors.

Great Grey Shrike in Inverness-shire.—With reference to the note on a great grey shrike *Lanius excubitor* near Kingussie on 2nd November 1952 (*Scot. Nat.*, 64: 168-169), I saw one on the Drumguish moor east of Kingussie on 29th December 1952, and again on 15th and 20th March 1953. This is within 300 yards of the place where one occurred on 1st May 1947. On 27th February 1953 I saw one at Achlean, three miles further east.—Richard Perry, Newtonmore.

Great Grey Shrike in Perthshire.—On 9th December 1952 Mr. George Campbell told me that he had heard that a keeper at Tullymet, near Ballinluig, had caught a strange bird in a trap set for a carrion crow, and had cut off one wing. On 11th December Campbell produced the wing, but a subsequent search by him for the rest of the body was of no avail owing to lack of direction by the keeper, who seemed to be quite uninterested. The bird had evidently been killed about the end of November or early in December. The wing was in fair condition and was clearly that of a shrike. I sent it to Mr. George Waterston, who identified it as belonging to a great grey shrike.—G. G. Blackwood, Pitlochry.

Albinism in Starlings.—On 19th June 1952 two pure white starlings *Sturnus vulgaris* were seen with a flock of young and adults, half a mile north of Newtonmore, Inverness-shire. Seen without glasses, they appeared pure white all over, though perhaps a little discoloured below, but there were no dark feathers. Two (? the same) were also seen at this time at Killihuntly in Glen Tromie.—Richard Perry, Newtonmore.

From the end of September 1952, a starling with some white marks on its back was conspicuous amongst the birds frequenting my garden. I caught it in a pyramid trap on 8th October 1952 and found that the light patches were due to several pure white rump feathers. The bird was an adult male, and was ringed before release.—Ian F. Stewart, Dumfries.

Chaffinch using Greenfinch's Nest.—On 25th April 1952, a greenfinch *Chloris chloris* was building in a Cupressus hedge separating the main road from a private garden. The nest was about 7 feet from the ground. On 29th April the nest was completed, and on 5th May the bird was sitting on three eggs. On 12th May the eggs had gone, probably robbed by boys. On 29th May, when passing the abandoned greenfinch's nest, I happened to glance up at it, and was surprised to see the tail of a sitting bird. I flushed the bird, which proved to be a hen chaffinch *Fringilla coelebs ;* the nest contained two chaffinch's eggs.

By 21st May the nest had been torn from the site and the eggs were gone. I examined the nest and found that the chaffinch had made a new lining inside the cup of the original greenfinch's nest. The lining consisted of hair and a few feathers. It was possible to remove this lining intact and leave the original greenfinch's nest just as it had been before taken possession of by the chaffinch.—D. F. Mursell, Johnstone, Renfrewshire.

Ortolan and Little Buntings and Fair Isle.—On 5th-6th May 1952 ortolan bunting *Emberiza hortulana* and reed bunting *E. schoeniclus* were prominent members of an immense trans-North Sea drift of Scandinavian summer-visitors which took place ahead of the cold front of a depression advancing northwards from East Anglia. The numbers of ortolans were quite exceptional even for Fair Isle, and of the fifteen or so on the island all except one were males. Two birds appeared on 4th, to be followed by others next day, and there were at least fifteen on 6th. They remained at this strength till 9th May, dropping to five on 11th and 12th, and to a single bird only during the next three days. Occasionally

odd birds delighted us with brief snatches of song at intervals taken from the more serious business of finding food on the newly-sown oat and turnip riggs. The female was seen on 8th and 9th. Two males also arrived on 21st May, and there was one on 26th.

In spring James A. Stout recorded a single little bunting *E. pusilla* on 14th April, and the first we have seen in autumn since 1948 was watched on 11th October by D. G. Andrew, D. Bateman and the writer. The distinctive head-pattern and lack of rufous on the lesser coverts and the " tic, tic " call-note were diagnostic. It is interesting to note that examples of this species were at Utsira and Lista in south-west Norway a few days previously.—Kenneth Williamson, Fair Isle Bird Observatory.

CORRESPONDENCE

THE EDITOR,
THE SCOTTISH NATURALIST

ISLE OF CANNA
28*th February*, 1953

DEAR SIR,

The Spiny Lobster in Scottish Waters

I read Mr. Eric Wilson's article on the above subject in your winter number with great interest. I have been fishing for crabs and lobsters in a small way for many years, and I have never encountered a spiny lobster in any of my own pots, but I have often heard lobster fishermen in the Hebrides talk about them, and I was surprised to read that only twenty-eight specimens had been reported from Scottish waters since 1924. For one thing, the spiny lobster is sufficiently well known to Hebridean lobster fishermen to have a Gaelic name—*pìobaire*, " piper ", given on account of its habit of squeaking when taken out of the water.

Since reading Mr. Wilson's article I have discussed the question of the spiny lobster with several lobster fishermen again, and can add the following records to those he gives:

Mr. Allan MacIsaac, retired lobster fisherman and postmaster, Isle of Canna, took a specimen off the west end of Sanday Island in 1939 when using a creel with an extra large eye.

Mr. Hugh Steele, lobster fisherman, Isle of Canna, tells me he has taken three specimens of the spiny lobster during the past forty years, all off the Isle of Canna.

Mr. John MacIsaac, lobster fisherman, Eriskay, tells me that he took a specimen on 18th February 1953 in Barra Sound, and has taken about four in the last few years. He says that the spiny lobster is more often taken in the Atlantic than in the Minch. Fishermen fishing the Atlantic side of the Outer Isles use creels with larger eyes as the ordinary lobsters there are larger than those in the Minch.

Mr. Angus John Campbell, retired lobster fisherman, Lochboisdale, South Uist, tells me he saw a big one that had been taken by a ring-net boat a few years ago. He has never caught one himself, but says they are known to be taken more often in the Atlantic, where creels with larger eyes are used. Mr. Campbell did his fishing in the Minch himself.

Finally, although I have never caught a spiny lobster, I have had two given me by fishermen, one in Barra in 1936—its photograph appeared in *The Bulletin* in August that year—and one at Canna in 1947 or 1948, by a fisherman from Mallaig.

This adds at least eight more instances of capture to Mr. Wilson's list, and I am quite sure that if a systematic inquiry were undertaken amongst Hebridean lobster fishermen many other instances would come to light. My impression is (*a*) most lobster fishermen in the Hebrides I have talked to have encountered the spiny lobster once or twice in their lifetime anyway, (*b*) the spiny lobster is probably therefore a rare resident here, but (*c*) the ordinary creel is not very suitable for his capture; therefore it is difficult to gauge how uncommon he really is.

I may add that Mr. John MacIsaac, Eriskay, told me he could not pack a spiny lobster along with ordinary lobsters when sending to market, because the spiny lobster would " poison " the others. I don't know whether this means the spiny lobster is likely to die early in transit. In any case, no one here is fishing for it deliberately with gear designed for its capture, which may be another reason why it is only seldom met with.

Yours truly,

J. L. CAMPBELL.

BOOK REVIEW

Zoogeography of the Sea. By Sven Ekman. London: Sidgwick and Jackson, Text-books of Animal Biology, 1953. Pp. xiv + 417. £2 2s.

This book represents an English translation of Professor Ekman's *Tiergeographie des Meeres* published in 1935 at Leipzig, and now extensively revised. It is a valuable book, and all whose interests it affects, geographers and palaeontologists almost more than zoologists, will welcome it in its new form.

Professor Ekman surveys the present condition of the marine fauna, and endeavours to interpret distribution in terms of what is known of the history of the oceans and of their inhabitants. He is not specifically concerned with the adaptation of animals to the various environments in the sea. It is the overall picture of the distribution of animals through all oceans and all depths which provide the main theme. It therefore follows that the reader should not go to this book expecting descriptions, for instance, of adaptation to life between tide marks in different parts of the world or within different substrates, rock, sand, or mud, at various depths. This is not a book on ecology.

The author has been able to demonstrate a number of important facts of distribution. In terms of depth, he distinguishes between a shelf fauna (down to some 200 metres, occasionally twice this depth), an archibenthic fauna and an abyssal fauna. In the water itself he describes an upper or epipelagic fauna and a deeper, bathypelagic fauna. These vertical divisions are based on sound evidence, but no attempt is made at further ecological subdivision. Then there is the question of horizontal

division, from equator to poles. Here distinction is made between warm-water, boreal (and antiboreal), and arctic (and antarctic) faunas. Boundaries here are primarily those of temperature, and for that reason are greatly modified by the action of warm or cold currents.

His main conclusions are of considerable interest. They reveal the effects of major barriers on distribution. There is, for instance, greater resemblance between the shelf fauna on the Atlantic and Pacific sides of the isthmus of Panama than there is between these faunas on the two sides of the Pacific.

The vast depths of the central Pacific represent a major barrier to distribution of shallow water animals. During the Tertiary shallow water (though not the deep water) faunas were in contact across what is now central America. The effect of this former connection is still apparent. Other facts of marine distribution are explicable when we realise the former presence of a great " Tethys Sea " which largely divided the continents into northern and southern components. Distribution of the abyssal fauna is controlled by the presence of submarine elevations such as those that separate the Mediterranean from the open Atlantic and the Sea of Japan from the open Pacific.

Professor Ekman does indicate in many instances how present distribution has been influenced by past changes in topography and in climate. This is no small achievement. Criticism is that conclusions tend to be obscured by the mass of supporting evidence. Summaries to each chapter or a final chapter dealing with general conclusions would have been very helpful.—C. M. Y.

Filmstrips. Published by Educational Productions Ltd., 17 Denbigh St., London, S.W.1. *Insect Life*, by Arthur Smith, 25s. *British Insects*, No. 4: Summer Moths, by George E. Hyde. *British Birds*, No. 4: The Barn Owl, by John Warham and Phillip E. Brown, 15s. *Our Birds*, by Sydney Rogerson and Charles Tunicliffe.

Each of these filmstrips consists of a series of about thirty pictures on a strip of 35 mm. film and is accompanied by a booklet of notes describing each picture in the strip; they are intended primarily for schools and educational establishments, and in general are of a very high quality and standard.

Miss LEONORA JEFFREY RINTOUL

It is with great sorrow that we record the death on 22nd May 1953, at Largo, Fife, of Miss Leonora Jeffrey Rintoul, a lifelong contributor to *The Scottish Naturalist*, and for very many years a member of its editorial board.

Our feelings of obligation to her, mingled with respect and affection, will be shared by all Scottish naturalists. We offer our sympathy to Miss Evelyn V. Baxter, with whom her labours, and their honourable rewards, have so long been shared.

THE BIRDS OF SCOTLAND

Their History, Distribution, and Migrations

by

EVELYN V. BAXTER and LEONORA JEFFREY RINTOUL

It has long been felt that a book dealing with the birds of Scotland as a whole was badly needed. The title of this book describes its scope in brief, and it is hoped that it will supply the want.

It is in two volumes and opens with four introductory chapters. These comprise a description of Scotland from an ornithological standpoint, some factors which influence our bird life, the composition of the Scottish avifauna, and migration. They are followed by the history, distribution, and migration (as it relates to Scotland) of each bird on the Scottish list under species. Much research has gone to the tracing of the history of the birds of which, in many cases, it has been possible to show the arrival and spread, in others the decline and ultimate disappearance. The distribution is very full ; the status of the bird is given, as far as known, in every county, beginning in the south-west and working through the south-east up to the north of the mainland.

In any work on Scottish birds the Isles must have an important place and much information relating to them will be found here. The migration movements are also dealt with under the species. The data are brought up to 1st January 1951 with an appendix which brings the most important occurrences up to 1st June 1952. Each volume has a coloured frontispiece, there are twenty-four illustrations from photographs, and a good map of Scotland.

The authors are well qualified to write such a book. They have devoted their lives to the study of Scottish ornithology, have travelled all over Scotland and most of the isles where they have worked steadily at the distribution and migration of the birds. For twenty-five years they visited the Isle of May during the migration seasons for the purpose of observing the birds there. They wrote the Report on Scottish Ornithology for twenty years, and are now organising the Wildfowl counts in Scotland for the International Wildfowl Inquiry.

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A Scientific and Educational Journal for Lancashire, Cheshire, Shropshire, Stafford, Derbyshire, North Wales, Cumberland, Westmorland, Isle af Man, the North-west, and Scotland

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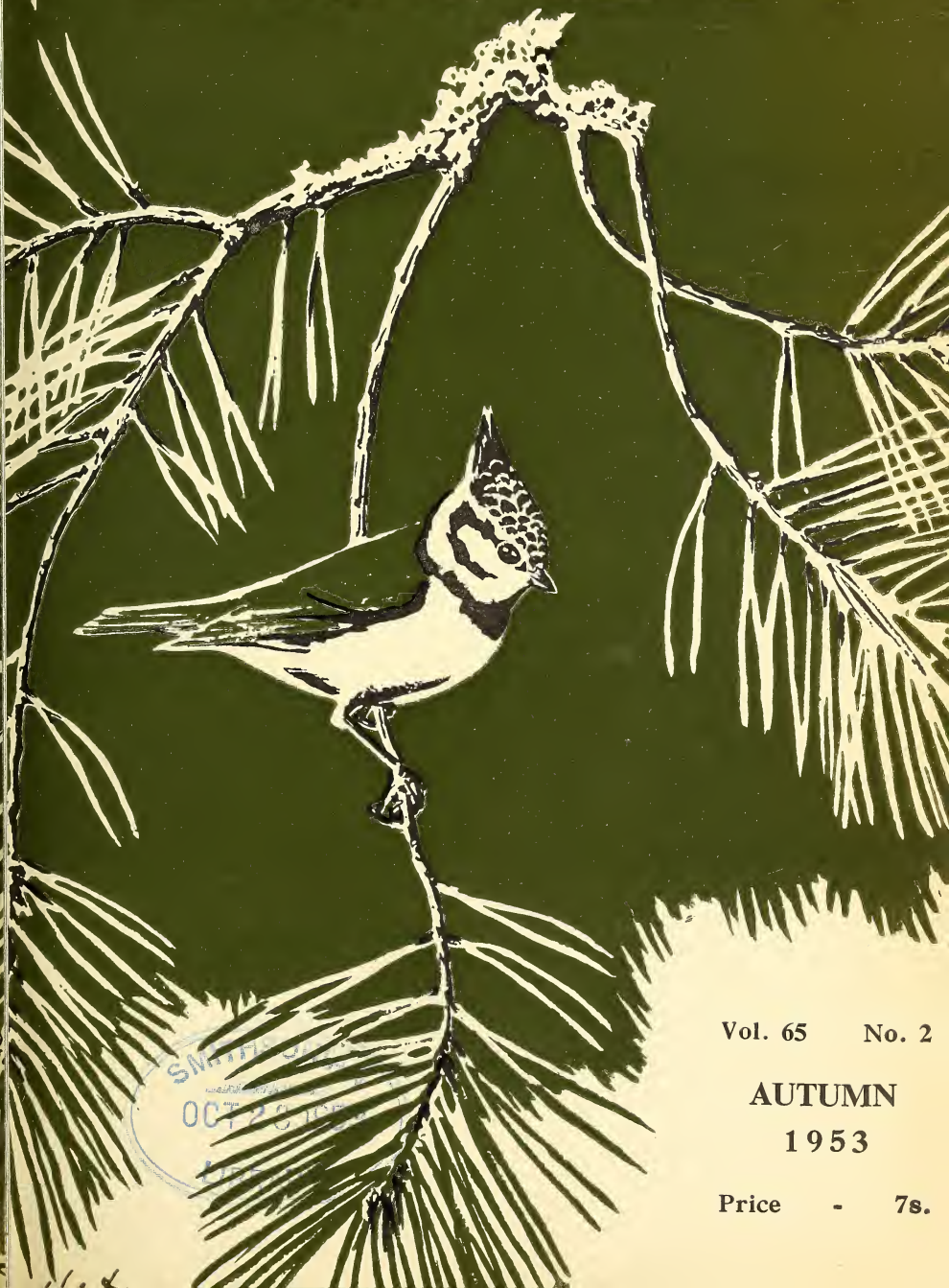

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The Scottish Naturalist

Volume 65, No. 2 Autumn 1953

MIGRATION INTO BRITAIN FROM THE NORTH-WEST, AUTUMN 1952 *

Kenneth Williamson
Fair Isle Bird Observatory

Introduction

The concept of migrational drift has so far been applied only to migration originating in the maritime region of Europe. The phenomenon was first discussed in broad outline by Misses E. V. Baxter and L. J. Rintoul (1918) in a review of their migration-watching experiences on the Isle of May in the Firth of Forth. Later, Dr. Finn Salomonsen (1935) came to similar conclusions in respect of European migratory species which reach the Faeroe Islands; and Professor James Ritchie (1940) showed that wind-influence was concerned in an extensive migratory movement of waxwings *Bombycilla garrulus* in 1921. In these cases, the drift was considered to be a resultant of the wind velocity superimposed on the birds' flight-speed in a southwards orientated direction. In discussing recent changes in the avifauna of Iceland in relation to the amelioration of climatic conditions during the past fifty years Gudmundsson (1951) has shown that the increasing frequency of continental visitors is to be explained by the greater incidence of southerly and south-easterly winds correlated with the climatic change. As classic examples of the drift of large numbers of a single species we have H. F. Witherby's (1927) account of the invasion of Newfoundland by lapwings *Vanellus vanellus*, and Salomonsen's (1951) analysis of the range extension to south-west Greenland of the fieldfare *Turdus pilaris*.

* *Received 23rd January 1953*

OCT 1 9 1953

Recently (1952) I have further developed this theory of migrational drift, with particular reference to the meteorological aspect, and have attempted to show that such drift is always down-wind, in no objective direction, and that the greater part of spring and autumn passage migration through the British Isles originates in this way. Discussions I have had with a number of ornithologists since the publication of these views show that, firstly, there is some hesitancy in accepting the theory as having a general application to all migratory stocks; and secondly, a feeling exists that the drift can only be a compromise between the direction and force of the wind and the " standard direction " flight of the birds. In the first case, it is considered that such drift is efficacious only against birds which use coastal routes, or make sea crossings, and that it does not operate against birds migrating by night across a land-mass since these are able to reorientate on their preferred bearing, and so correct their previous displacement, next day. This presupposes the existence in all birds of an innate sense of true orientation, except for those individuals which reach extra-limital regions as casuals or scarce vagrants, and which are presumably deficient in this respect. The second case is a corollary of the first. Because of this innate faculty, the amount of the drift must be a resultant of the bird's speed in its " standard direction " and the velocity of the gradient wind, and if the relevant data were known, the drift could be assessed by application of the triangle of velocities.

There are obviously immense difficulties in the way of establishing proof for, or objections to, any of these views. For the present it would seem that the only way of securing the general acceptance of any principle is to analyse a growing number of situations and see which of the theories is supported by the great majority of cases. There are several ways of attacking the problem, and the most obvious are the examination of observational data collected by the bird observatories in past years, concentration on the annual migration " patterns " of selected species, and an attempt to interpret the ringing recovery records of birds marked when on passage through Britain. As a contribution to the problem, the following review of an important part of the autumn migration of 1952 is offered.

Scope of the Present Study

From mid-August to early October 1952 the frequent excursions of the Azores anticyclonic system into the north-eastern part of the Atlantic Ocean created favourable migration weather for birds entering Europe from Greenland and Iceland. In consequence of so much high pressure to the west of the British Isles there was a good deal more wind from northerly points than is usual at Fair Isle at this season, and a marked absence of those conditions in the North Sea which initiate migrational drift from the Continent. Thus, whilst falls of migrants from the east were few and relatively unimportant until October, there was excellent opportunity to examine the effect of meteorological conditions on bird movements originating in the north-west.

These populations are in some respects more fascinating than their continental counterparts. Their breeding-range, and thus the source of their migration, is much more restricted; all have, presumably, a strongly implanted south-east "standard direction" of autumn migration; and all must, whether they like it or not, cross very considerable stretches of sea. The fact that they continue to maintain themselves in considerable numbers on these distant breeding-grounds, in the face of such hazardous journeys, seems at first sight to reveal a great weakness in the theory that all birds are subject to the dangers of migrational drift.

Nevertheless, I have used the theory as a working hypothesis as I consider that it has been sufficiently demonstrated by the authors mentioned in the case of continental birds crossing the sea. Taxonomic considerations have been used whenever possible to fortify this approach. The various species, since they are few, are dealt with under separate headings, more or less in the order of their appearance, and the dominant weather conditions at the times of their main arrivals are discussed in some detail.

In a following section I have sought additional support for my contention that these are stocks of north-western birds by showing that, with one important exception, their movements were carried out at different times, and under different weather conditions, from those of the exclusively continental species

which reached Fair Isle during the early autumn. Finally, I have attempted to summarise and discuss the main features of this migration from the north-west in relation to the general meteorology of the area, enquire to what extent the concept of migrational drift applies, and see what light the movements throw on more fundamental problems of bird-migration.

Acknowledgments

My thanks are due to Dr. Holger Holgersen (Konservator of Stavanger Museum, Norway), Major R. F. Ruttledge (Great Saltee Bird Observatory, south-east Ireland), Mr. L. S. V. Venables (Dunrossness, south Shetland), Mr. Alexander Tulloch (Flannans Lighthouse), and Mr. James Dixon (Tory Island Lighthouse) for allowing me to use certain of their observations; and also to those visitors to Fair Isle who played a part in the compilation of our own records during this period. I am also grateful to Professor V. C. Wynne-Edwards for helpful discussion concerning the presentation of the material.

The Weather Charts

Diagrams based on the appropriate issues of *The Daily Weather Report* of the Meteorological Office of the Air Ministry are used in illustration of most of the cases discussed, and these have been selected with a view to providing as complete a picture as possible of the conditions governing the journeys of the north-western populations. I am grateful to the Controller of H.M. Stationery Office for permission to use these diagrams. They are arranged and numbered in chronological sequence, for in some instances they relate to more than one species and are therefore referred to under two or more different headings.

Those readers who are inexperienced in reading weather charts should bear the following points in mind. The direction of the gradient wind follows the run of the isobars (lines of equal barometric pressure at sea-level, shown at four-millibar intervals), with an inwards deviation of about 15° towards the centre of a depression or low, about which the air-circulation is counter-clockwise. Contrary conditions are to be found in an anticyclone or high. The circles at recording stations indicate the amount of cloud-cover and the direction and force of the

wind: the arrows fly with the wind and each full flèche represents 2° on the Beaufort wind-strength scale. A double circle represents a calm. Warm fronts are marked by a line of half-circles, cold fronts by triangles, in each case pointing in the direction of movement of the front. When the two marks fall alternately an occlusion, where the cold air of a depression has forced the warm sector to rise above the ground or sea level, is indicated.

The Species

1. *The Wheatear*

The heaviest and most important passage from this direction in past years has been the one we associate, on a general relationship between wing-length and body-weight of trapped birds, with the Iceland-Faeroe populations of the wheatear. These populations were given the name *Oenanthe oe. schiøleri* by Salomonsen (1927), with type-locality in south Iceland: the form stands intermediate in wing-measurement between the typical and Greenland races, with a considerable overlap at either end of the cline, and in view of the impossibility of correctly assigning a majority of specimens in the museum, *schiøleri* is not generally recognised by taxonomists. Mackworth-Praed and Grant (1951) have relegated the name to the synonymy of the Greenland wheatear *Oenanthe oe. leucorhoa*. Passing through Fair Isle in late August and September we have a group of wheatears which are on average heavier than our local birds, and only slightly longer in the wing, and these we believe represent migrant birds, so-called *schiøleri*, of Faeroese and Icelandic origin.

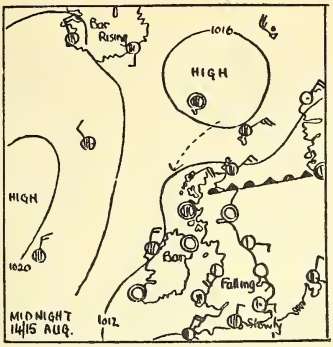
The passage of these birds, although it was very considerable in 1951 (for details see Williamson and Butterfield, 1952) failed to materialise in the present autumn. There was good evidence that in 1951 the movement into Shetland took place about 16th August, and at the same time in 1952 weather conditions in Faeroe were very similar to those of the previous year. A vast ridge of high pressure extended north-eastwards from an Azores anticyclone, embracing Iceland and Faeroe on 13th-14th August, bringing calms or light airs and clear skies. Shetland, though enjoying the anticyclonic weather, had a persistent moderate north-easterly airstream by virtue of its

position on the eastern side of the high; and this airstream, it is believed, bore the anticipated wheatear movement away to westward of our area and into the Hebrides and Ireland.

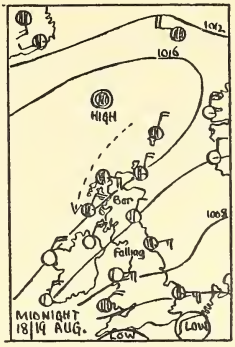
This view is based entirely on negative evidence so far as Fair Isle is concerned, but it finds some support in observations made in the south of Shetland and at Great Saltee. Shetland birds also moved out at this time. L. S. V. Venables writes: " My impression (no counts to back it) is—abundant to 13th August, marked drop 14th, still common until about 20th, when an increase; decrease 23rd August." The Irish bird observatory recorded a second phase of wheatear passage beginning on 15th August and continuing on 19th and 21st (Figs. 1*a* and *b*): an earlier phase, continuous between 5th-9th August, was presumably due to the departure of British birds. Unfortunately this is a difficult species to trap at Great Saltee, so we are without any taxonomic evidence which might assist in identifying the birds.

Heavy individuals which were perhaps on passage from the north-west were taken at Fair Isle on 16th, 18th, 20th, and 22nd, but otherwise the birds trapped did not differ in weight and wing-length from our local stock. There was only one brief spell, from late 23rd to early 25th, when any marked passage of bigger birds was reflected in the trapping data. Details of weights and measurements of this sample are given in *Bull. Fair Isle B. Obs.*, no. 8, p. 32, and as five of the ten captures were adults, it may be assumed, from 1949-51 experience of these movements, that the bulk of the first-winter birds were already far ahead. Typical col conditions arose suddenly in Faeroe and Shetland during 23rd when an old depression was receding eastwards from the area; light north-west winds late in the day were followed by a calm night, but these conditions were short-lived owing to the growth of a new depression along the Atlantic arctic front separating the Azores and Greenland highs (Fig. 2).

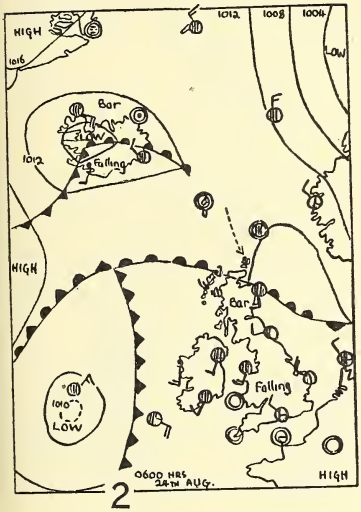
There were later small movements of the bigger birds, notably arrivals in cyclonic weather on 2nd September (2 ad. ♂♂ trapped, wings 99-100 mm., weights 26·6 and 27·7 gm.) (Fig. 3); whilst occasional *leucorhoa* were taken in anticyclonic weather on 11th (ad. ♂, wing 107 mm., weight 39·5 gm.), 14th and 16th (Fig. 6). There was a considerable increase in


Bar Rising
1016
HIGH
HIGH
1020
Bar
Falling
Slowly
1012
MIDNIGHT 14/15 AUG.

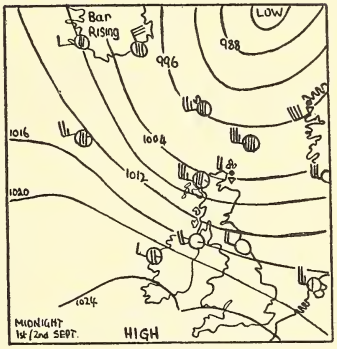
1A


1012
1016
HIGH
Bar
Falling
1008
MIDNIGHT 18/19 AUG.
LOW
Low

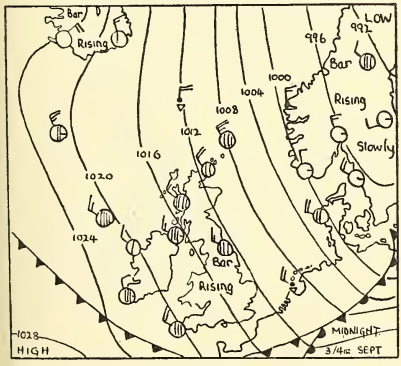
1B


HIGH
1012
1008
1004
1016
LOW
Bar
LOW
1012
Falling
HIGH
Bar
Falling
1010
LOW
0600 HRS 28TH AUG.
HIGH

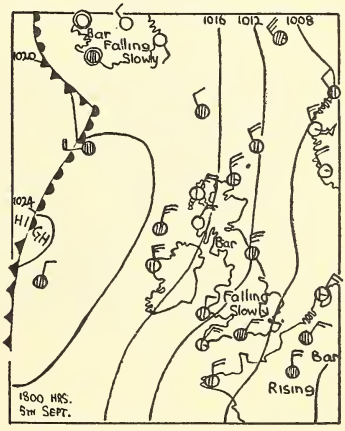
2


Bar Rising
LOW
988
996
1016
1008
1012
1020
1024
MIDNIGHT 1st/2nd SEPT.
HIGH

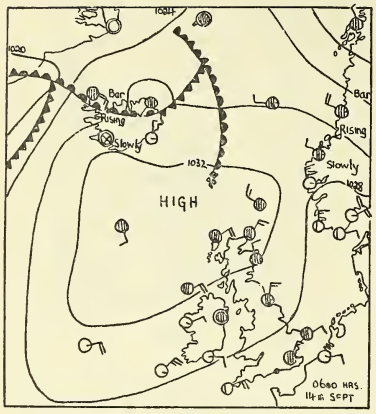
3


Bar
Rising
LOW
992
996
1000
Bar
1004
1008
Rising
Slowly
1012
1016
1020
1024
Bar
Rising
1028
HIGH
MIDNIGHT 3/4TH SEPT

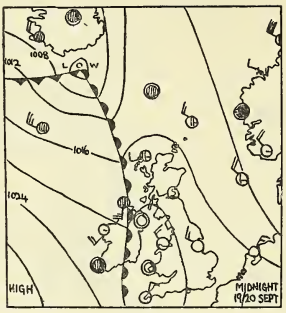
4


Bar
Falling
Slowly
1016
1012
1008
1020
1024
HIGH
Bar
Falling
Slowly
Bar
Rising
1500 HRS. 5TH SEPT.

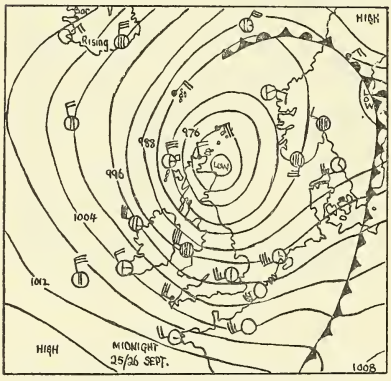
5


1020
Bar Rising Slowly
1032
HIGH
Bar Rising Slowly
1028
0600 HRS. 11TH SEPT

6


1008
LOW
1012
1016
1024
HIGH
MIDNIGHT 19/20 SEPT

7


Bar Rising
HIGH
976
988
996
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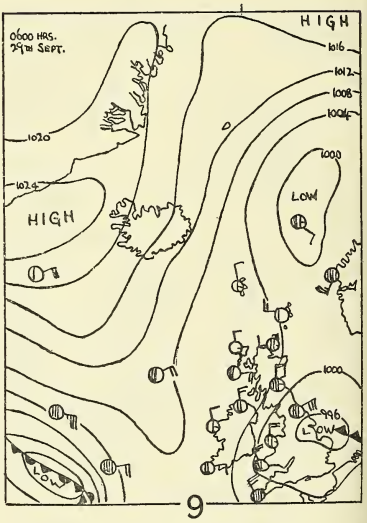
LOW
HIGH
MIDNIGHT 25/26 SEPT.
1008

8


0600 HRS. 29TH SEPT.
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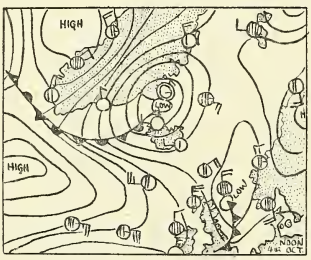
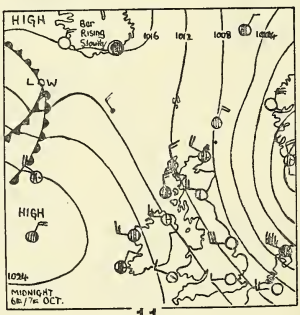
1000
996
LOW
LOW

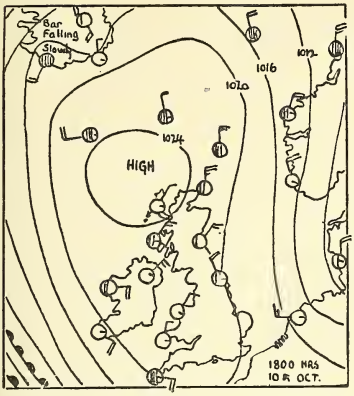
9


HIGH
LOW
HIGH
LOW
LOW
FOG
MIDNIGHT 6th/7th OCT.

10


HIGH
Bar Rising Slowly
996
1012
1028
LOW
HIGH
1024
MIDNIGHT 6th/7th OCT.

11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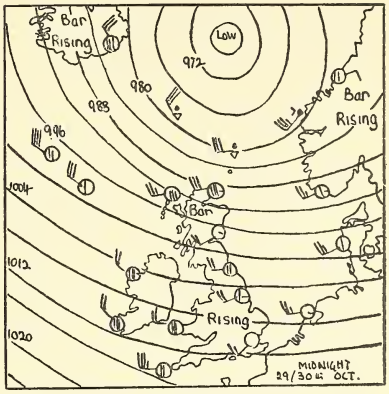
12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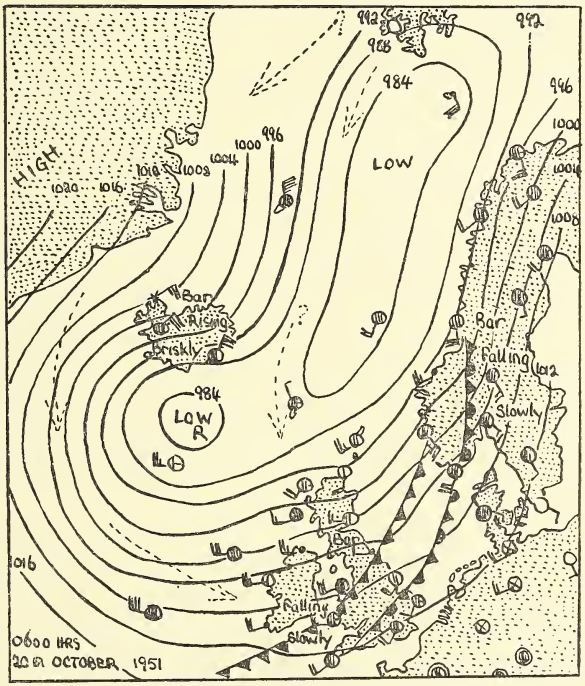
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20 OCTOBER 1951

14

wheatears on 26th September, to about 100 birds, and field-observations, supported by trapping, suggest that many of these were of the Greenland race. There was some diurnal passage of big wheatears under col conditions on 3rd October.

The question of the immediate origin of the wheatears of 26th September is an interesting one, for at this time an unusual drift was taking place into Fair Isle from the west-central coast of Norway round the northern side of a depression whose centre was moving eastwards from Caithness into the North Sea (Fig. 8). This is known from the nature of the arrivals at Fair Isle and at Utsira in south-west Norway, and further reference to this period is made in a later section of this paper. It will suffice here to say that it is more reasonable to suppose that these wheatears arrived from Norway than by cyclonic migration from Greenland since, on the basis of a cyclonic drift, they would have been taken far to the south of Fair Isle, probably to southern Ireland or France.

That these birds had sustained a long cyclonic migration and had not just " hopped over " from Shetland is suggested by the low weights of the two birds trapped: 26th, ad. ♂, wing 107 mm., weight 29·85 gm., and 27th, first-winter, wing 105 mm., weight 23·02 gm. (cf. the anticyclonic migrant of 11th September). And it is surely more than coincidence that Dr. Holgersen is confident that the wheatears he observed at Utsira singly from 17th, increasing to three on 25th and six next day, were all *leucorhoa*—this opinion being founded upon field observation supported by collecting (♂, 24th September, wing 106 mm., and ♀, 2nd October, wing 101 mm.). The passage of 3rd October was in all probability the onward flow of this drift out of Shetland, and a further movement of *leucorhoa* took place at Utsira at this time.

It should be emphasised that the unusually strong north-eastward extension of the Azores high pressure system during mid-September, especially between 13th-15th (Fig. 6), could well have deflected a large number of Greenland passerines to the Norwegian coast. In addition to these wheatears, the high arctic form of redpoll *Carduelis h. hornemanni* was collected by Dr. Holgersen, on 21st September, and it seems likely that the few Lapland and snow buntings which appeared there at this time may have been Greenland and not Norwegian birds (see

below). Dr. Holgersen informs me that reports from the Norwegian weather-ship *Polar Front* (position about 66° N. 2° E.) give evidence of some movement, including " one bird looking like a wheatear, and repeatedly some which seemed like snow buntings ".

2. *The White Wagtail*

Much of the white wagtail *Motacilla a. alba* passage at Fair Isle has an Icelandic origin, though this is also a frequent drift-migrant from the Continent in most years; and, as there is no taxonomic difference between the two populations, the white wagtail movements are sometimes difficult to analyse. Passage began on 15th August in 1952 and built up to a peak of 40-plus on 19th, whilst L. S. V. Venables observes of south Shetland that " migration started with a minor rush on 17th-18th ".

It could be argued that these birds might equally well have reached the Shetland area by direct immigration from Norway, or by drift from the same region in the north-easterly airstream flowing along the eastern side of the ridge (Figs. 1*a* and *b*). An objection to this view, however, is that the only species which showed a significant increase at Fair Isle at this period were birds which could also have had a north-western origin, whilst peculiarly continental species were practically absent. There was steady passage of meadow pipits and on 19th, the peak-day, an invasion of redshanks (20) and the first 2 merlins, an Icelandic ♂ being trapped (see below).

It may seem remarkable that white wagtails from Iceland should enter, and wheatears by-pass our area at this time, but two points should be borne in mind. Whereas the wagtail does not breed (except irregularly) in Shetland, so that any migration through the islands is at once obvious, the passage of small parties of *schiøleri* wheatears from the same source would pass unnoticed among the large concentration of local birds. Furthermore—and this is important—the white wagtail is normally a day migrant, using visual cues, and therefore less subject to drift than the wheatear, which migrates very largely by night. The fact that the peak at Fair Isle was a day later than the concentration in south Shetland accords with the view of a diurnal movement in this case.

There was a resurgence of white wagtail migration when

our only good bag of *schiφleri* wheatears was made on 23rd (Fig. 2), the wagtails increasing during that day, the wheatears coming in overnight. There were slight increases also on 25th and 27th and these can be considered together with the next movement, since the meteorological events were similar in each case. A well-marked passage which took place between 1st and 5th September, with a peak of over forty birds on 2nd, can only be accounted for by postulating cyclonic approach from Iceland round the south-west side of a depression which had crossed that country, leaving a rising barometer and light winds in the west (Fig. 3). No other explanation is possible. Firstly, entry from the Continent by drift is out of the question, and by direct approach from Norway or Shetland a physical impossibility against the gale-force head-winds in Forties and East Fair Isle. Secondly, as one would expect with a cyclonic approach of this nature, birds reached Fair Isle and the west of Britain practically simultaneously: movement through Saltee began on 2nd and reached its climax with nearly fifty birds on 4th, and we are justified in allowing a slight delay between their appearance at this observatory and the first arrivals on the north and west coasts of Ireland. According to information from Mr. Peter Conder, white wagtails passed Skokholm (S. Wales) from 21st August to 1st September with peaks on 24th-25th and 30th August. A second wave reached Skokholm (4 birds) on 4th September, increasing gradually to 70 birds on 6th.

3. *The Merlin*

The autumn was notable for the number of merlins trapped —including three on one day, 4th September—and for the fact that all seven of the birds were referable to the Icelandic race *Falco columbarius subaesalon*. The situation at Fair Isle is not complicated by the movements of British birds, which are resident, and the fact that one of a Shetland brood of four fledglings, ringed for us on 31st July by Mr. W. Kay, was recovered nearby at the end of December suggests that this applies also to the Shetland stock. There are thus good grounds for believing that the merlins which pass Fair Isle continuously from mid-August to mid-October must come from either the north-west or the east. The authors of *The Handbook*

of British Birds (vol. 3, p. 23) accept the latter alternative, but the facts support the opposite view.

The Icelandic race is easily separable from the continental by its longer wing, sex for sex, with virtually no overlap. Our trapped birds measured, ♂♂ 205-210 mm., ♀♀ 228-232 mm., all beyond the upper limit of over a hundred Scandinavian specimens measured by Salomonsen (1935), viz. ♂♂ 193-202 mm., ♀♀ 199-222 mm. It is possible of course that some of this passage emanates from Faeroe, although the very few Faeroe breeders are said by Salomonsen to be sedentary.

Merlins were regular from the time of the first white wagtail peak, an Icelandic male being self-trapped on 19th August (Fig. 1*b*) and it was just after the wagtails' second peak at the beginning of September that these small falcons were most in evidence. They made a cyclonic approach to Scotland, where they winter (on the evidence of recoveries of Iceland-ringed birds), in a direct north-nor'westerly stream of air on the flank of a huge depression then covering the whole of Scandinavia (Fig. 4). Two other merlins were trapped on 16th and 20th September and the latter, a male with a wing of 210 mm., was almost certainly a new arrival as three birds were recorded that day, although none had been seen on 19th. Col conditions—again very short-lived owing to the rapid growth of a low near Iceland—extended from Iceland through Faeroe to Scotland during the night (Fig. 7).

The bird of 16th, a female with wing 228 mm., was found dead near Wick, Caithness, on 3rd October, and the male trapped on 19th August was picked up in a slightly injured condition near Blairgowrie, Perthshire, in January.

4. *The Lapland Bunting*

The prevalence of these high pressure conditions to the west assisted the emigration of Lapland buntings *Calcarius lapponicus* from Greenland, and their movements accorded closely with the general pattern we had become accustomed to in previous years. The first was heard on the moorland on 27th August, there were two with the second white wagtail movement of 1st-2nd September, and the first real influx was the arrival of seven birds on the peak merlin day of 4th September (Fig. 4). These had increased to thirteen by 6th, and although the

earlier arrivals were cyclonic, by 5th an extension of the high west of Ireland was influencing south-east Greenland and Iceland (where there had been comparatively calm weather since 3rd) and was providing a light north-westerly airflow to the British Isles (Fig. 5). I ought to emphasise that this situation offers a very close parallel to those under which similar invasions of Lapland buntings have been noted in previous autumn seasons, notably between 6th-8th September 1951 (eighteen birds) and 10th September 1949 (forty, with as many snow buntings).

For the first few days following their arrival the Lapland buntings remain in a small flock, with scattered individuals elsewhere, but they soon disperse more widely and changes in strength become difficult to tally. Like the merlins, they show no eagerness to pass on, which suggests that they are near the end of their journey, yet there is apparently no knowledge of the location of their main wintering-area. About half-a-dozen birds were recorded on most days down to the middle of the month, and three on 21st following a few blank days were probably new arrivals from southern Greenland in a west-nor'west airstream between a mid-Atlantic high and a day-old depression centred on Faeroe. This eastwards moving low is shown in Fig. 7. One bird on 29th succeeded by five next day seem likely to have originated in eastern Greenland, where the weather had been markedly anticyclonic for several days, travelling via Iceland along the eastern side of a ridge reaching towards Ireland (Fig. 9). Three more appeared with redpolls on 5th October and are discussed with that species below, and there were four birds on the 7th (Figs. 10 and 11).

5. *The Redpoll*

As might be expected in view of the weather, the Greenland low arctic form of redpoll *Carduelis flammea rostrata* was more in evidence than usual in the autumn of 1952. The first was watched on Buness on 7th September, the day following the first Lapland bunting peak, feeding avidly on the seeding heads of *Plantago maritima* and *P. coronopus*. There were scattered occurrences in mid and late September, including two on 12th and two on 24th in anticyclonic weather, and a single

bird on 5th October was succeeded by five next day. During the week from 10th October there were three or four daily, and at this period they were mostly in the stubble or the stackyards, but occasionally also in the sheltered cabbage patches.

The birds of 5th-6th October were cyclonic migrants and the low weight of one trapped (14·73 gm., increasing in four hours to 15·02 gm.) is a testimony of this. If these birds came direct from Greenland—and the unsuitability of the weather in the Iceland-Faeroe sector suggests that they did—then the route must have rounded the south-western flank of a depression which had developed quickly over Iceland on 4th. It is difficult to visualise any nearer point of origin since this depression brought a vigorous gale to Iceland (with hurricane force winds on 5th) which must have inhibited any attempt at migration there (Fig. 10). The developing low had very little effect, however, on the comparatively calm weather which had prevailed for several days in a ridge over south-east Greenland.

The arrivals of 10th took place in the northerly airstream on the eastern side of a high situated to the south of Iceland: the birds may have been " off passage " since the previous movement somewhere along the route, since examples trapped on 12th were up to normal weight, ♂ 21·2 gm. and ♀ 19·7 gm. (cf. 14 gm. and 14·7 gm. for two ♂♂ *C. f. flammea*) (Fig. 12).

During the first week of October both *flammea* and *rostrata* were on the island together and it was interesting to compare the field-characters of the two races. The Greenland birds had much darker brown mantle plumage with very little admixture of grey; they were broadly and boldly streaked with brown on the flanks, and the rump showed little or no white. They were almost invariably alone or in the company of their own kind, and were very approachable, so that with glasses the strong bulging bill could be appreciated without difficulty. The slighter and greyer mealy redpolls associated much with the huge flock of twites *C. flavirostris* which roam the stubble and root-crops at this time of the year, although, on a few occasions, they too were to be seen in a separate group. When with the twites, they were difficult to spot until the flock rose and their whitish rumps gave them away.

6. *The Snow Bunting*

Single birds on 6th (but a flock of six in the south of Shetland —Fig. 5) and 8th September, three on 11th, the first big party of twenty on 14th (Fig. 6), and a dozen or so on 20th (Fig. 7), all coincided with anticyclonic weather to westward, and thus their movements at this period followed the general pattern we have seen in past years. They were doubtless Greenland birds. Later, from the end of September, a part of our snow bunting passage is drawn from the Continent in most years, and in fact, a large influx of about a hundred birds took place at the beginning of the cyclonic period of 25th-28th September mentioned under *The Wheatear* and discussed in more detail in the section on continental immigrants below (Fig. 8). Whilst it is impossible to be sure of the origin of these birds, Greenland seems at least as likely a source as the mountains of Norway. There was a pronounced westerly airstream between Greenland and Norway on 10th and again from 12th-16th September (Fig. 6) and the snow bunting movements in 1952 showed a remarkable parallel with those we observed in mid-September 1949. In that year a similar anticyclonic situation to the one shown in Fig. 6, from 10th-12th, brought the first big parties of snow and Lapland buntings to Fair Isle, and a few days later a North Sea low pressure development similar to that shown in Fig. 8 coincided with the biggest snow bunting invasion—well over a thousand birds—ever recorded at the isle.

An increase to over a hundred birds on 7th October accompanied the arrival of new redpolls (6th) and Lapland buntings (7th) (Fig. 11). An interesting bird was trapped on 6th October, but its weight, 30·73 gm., suggests that it was not a new arrival. It was an adult male in the phase of plumage having white primary coverts, and it had the reddish-brown mantle plumage with strong black feather-centres and darker underparts which characterise the Iceland race *Plectrophenax nivalis insulae*. It was compared in the laboratory with skins of the typical race (with which the Greenland bird must be included) and an adult male *insulae* shot on the Stirlingshire coast and now in the Royal Scottish Museum. This race, although not yet admitted to the British list, winters regularly in Faeroe, according to Salomonsen (1947), and Col. R.

Meinertzhagen's collection contains two specimens which he shot from a flock in the Outer Hebrides in January 1934.

7. *The Redwing*

This is the one north-western passerine which does not appear to have responded to the excellent passage conditions. Normally we trap a number of the Iceland subspecies *Turdus musicus coburni* during October, and an analysis of the movements through Fair Isle of this and the typical race (from which the great majority of individuals are easily separated on plumage-characters and weight) has already been published, the study being based on the 1949-50 migration seasons (Williamson, 1953). Summarising this, it can be said that much of the earlier immigration of *coburni*, from mid-October, takes place under either col or anticyclonic conditions, and at such times this race is likely to be found together with drift-migrant *Turdus m. musicus* on redetermined passage after a short resting-period in the northern islands. The failure of *coburni* to appear among the redwing trappings at this period in 1952 may be due to the fact that a sequence of depressions in the Iceland area delayed their departure.

A single *coburni* was trapped on 15th October, but following this there was a period of strong disturbances in the Iceland-Faeroe region and no further arrivals took place until the end of the month. Six *coburni* were then trapped between 31st October and 2nd November, two of these being driven from a flock of twenty birds on 1st. They appear to have arrived as cyclonic migrants on the south-western side of a depression midway between Iceland and the Norwegian coast (Fig. 12). Two more Iceland birds taken on 9th and 10th November arrived in similar weather.

8. *Other Species*

As in former years, there was considerable movement of geese during cyclonic weather at the end of October and early November, with groups of five and seventeen pinkfeet *Anser arvensis brachyrhynchus* (probably Icelandic) on 30th-31st, a skein of black geese thought to be barnacles *Branta leucopsis* on 30th and small parties of grey lags *Anser anser* on 1st-2nd November. Five whooper swans *Cygnus cygnus* were also seen on 30th (Fig.

13). A large gaggle of twenty-three pinkfeet and five whooper swans were also identified on 11th October, the only instance we have so far recorded of a considerable movement of these big birds under anticyclonic conditions (Fig. 12).

The second Fair Isle example of a Greenland whitefront *Anser albifrons flavirostris*, an adult female, was shot by James A. Stout on 5th November: it was a light bird, and had probably just arrived. As in the case of the previous specimen, a young bird collected on 15th September 1951, it came in during a period of cyclonic weather. The circumstances attending the 1951 occurrence and the simultaneous appearance of a number of these geese at their Irish wintering-grounds have been described by R. F. Ruttledge and the present writer (1952).

A more convincing picture of the pattern of goose immigration is available for late October 1951 as a result of the careful observations made by lightkeepers Alexander Tulloch at the Flannan Isles and James Dixon at Tory Island, north-west Ireland. In that year there was a second big wave of Greenland whitefronts in Ireland between 20th-22nd October, according to Ruttledge, and on the same days Venables' counts showed a rapid build-up in the numbers of whooper swans at Loch Spiggie in Dunrossness, 104 birds being present by 22nd. There were grey geese, and a few swans, passing Fair Isle, and a heavy movement of barnacle geese took place at the Flannans and Tory Isle. Over 200 birds landed on Eilean Tigh early on 21st and 30 reached Tory the same day, increasing to 100 on 22nd. Early on 23rd nearly 300 barnacles rested on Eilean Tigh for two hours before passing on to south-east; there were smaller numbers between 25th and 29th, also a few at Tory, and on 30th about 500 arrived at Eilean Tigh and Soray and remained a week.

As in the case of the whitefronts, the barnacle geese almost certainly originated in east Greenland, though Spitzbergen birds may also have been concerned. The weather charts for 19th-20th October 1951 show that this immense invasion took place by cyclonic approach along the western flank of a huge depression (Fig. 14). By early 21st low " R " had moved to northern Scotland and there were almost straight isobars (and therefore a following wind-stream) from north-east Greenland through the Iceland-Faeroe seas to the British Isles.

Immigration from the Continent

Although some of the birds dealt with in the foregoing section can be ascribed to north-westerly populations on their taxonomic characters, this is not true of all of them, and there may be some objection to the rather fine splitting used in the case of such birds as wheatear and merlin. For these reasons it is worth-while examining the situation at Fair Isle in regard to continental immigrants during this period, to see whether this lends or denies support to the view that the movements so far discussed embrace birds of a different origin.

It is clearly advisable to restrict such a review to the exclusively continental species, i.e. those whose distribution does not extend to Shetland, Faeroe, Iceland or Greenland. For this reason several species of Charadriiformes and Anseriformes which could have originated in either zone have not been considered. For the sake of brevity and avoidance of confusion, only the August and September movements are dealt with: the October flood of winter visitors to our area, with their tendency to remain in the north for days or even weeks before moving on, renders an accurate analysis of this period very difficult.

Another aspect to be considered is that single occurrences of one or a few continental species do not constitute a significant fall of migrants, for, in col and anticyclonic weather especially, there is always a trickle of such birds moving south after an off-passage resting period in Shetland or Faeroe. The occurrence of three willow-warblers and a garden warbler on 17th, and of willow and barred warblers and green and wood sandpipers on 20th-21st August fall into this category.

A weak easterly airflow between the west coast of Norway and Shetland during the night of 29th-30th August, between a shallow trough in Forties and a high centred over Jan Mayen, coincided with the first real movement of continental birds. There were willow-warbler (15), pied flycatcher (6), grasshopper and garden warblers, whitethroat, ring ouzel, whinchat (2), wryneck, sand-martin, buzzard, ruff, greenshank and a few herons. There was no influx of either white wagtails or merlins at this time, though these showed increase during the next few days when strong west winds, veering north-west,

prevailed. As already emphasised, the hypothetical methods of approach from the Continent, by down-wind drift or direct immigration on a south-west orientation, were equally out of the question with this weather (Fig. 3).

A few continental birds appeared on 6th and 7th September but these were days on which redetermined passage of the earlier drift migrants, resting during the gale, could be expected to proceed from Shetland. The general situation is depicted in Fig. 5: by midnight, skies were cloudless and winds light in both Faeroe and Shetland. Again the continental representation was very small, and the only evidence of real movement (except for cormorants passing southwards from Shetland) is provided by the Lapland buntings, a species not present in the earlier continental drift.

The 9th was a more interesting day with the following species recorded: heron (increase), kestrel (2), barred and garden warblers, blackcap, willow-warbler (4) and pied flycatcher. Next day, single lesser whitethroat and scarlet grosbeak were added. This certainly suggests a new influx, if a small one, from the Continent, and it is noteworthy that none of the supposed north-western birds showed increase on these days. With a complex low pressure disturbance over Dogger, extending to England during the night of 8th-9th, and an anticyclone over Scandinavia giving calm and very nearly cloudless conditions on the west coast of Norway, a small drift to Shetland in the easterly airstream between the two airmasses was a possibility.

There was a pied flycatcher on 11th and six next day, with willow-warbler (3), blackcap, whinchat and some herons, and cormorants were again moving past from Shetland. This also was an anticyclonic period when passage southwards of the earlier drift-migrants could be expected. Fig. 6 depicts a similar situation.

No further invasion from the Continent took place until 25th-26th September, and this was followed by a big fall of continental immigrants on 30th. This period must be dealt with in some detail, since it is clear that certainly one and in all likelihood two north-western species were mixed up in it. During the first phase a deep depression moved eastwards from Caithness into the North Sea, giving north-east to north winds

at Fair Isle, and it is believed that the birds which reached us were cyclonic migrants round the northern side of the depression from Norway (Fig. 8). They were mainly common gulls: we have had previous experience of these birds arriving in numbers under similar cyclonic conditions, notably on 31st August 1951. Waders were well represented, turnstone (50), redshank (50), dunlin (10) and our first oyster-catchers for nine days. At the outset, about a hundred snow buntings arrived (no increase at Utsira till 27th) and twenty wheatears on 25th increased to a hundred next day ; there were also one or two warblers, and up to a dozen each of redwing and fieldfare. It is known that at least some of the wheatears were *leucorhoa*, and it is curious that the snow buntings so greatly outnumbered the *Turdus* spp. if they were in fact Scandinavian birds.*

Conditions changed on 29th-30th, a small depression forming off the west coast of Denmark and causing a westwards drift from the Skagerrak on its northern side, a type of situation I have previously mentioned (1952, p. 17) as being productive of marked migrational drift. The early stage of this depression is shown in Fig. 9. There was an enormous increase in the *Turdus* spp. to over a thousand birds, a much better representation of warblers, flycatchers and other passerines, but neither snow bunting nor wheatear increased. Lapland buntings, however, did increase to five birds, but examination of Fig. 9 will show that an influx from either direction was possible on this day.

Summarising, it is clear that except for the cyclonic movement of 25th-26th September from west Norway, arrivals of strictly continental birds and of species of presumed north-western origin did not coincide, but took place under different weather conditions. Some coincidence is to be seen with anticyclonic or col weather in the Faeroe-Shetland region, but at these times the numbers of continental birds are not significant of any real movement and they accord with the view that

* There were snow buntings at Utsira from 16th September to 24th, with peaks of nine on 18th and seven on 22nd. Dr. Holgersen points out that only one or two specimens were present during the influx from east on 30th, with a light south-east wind, which brought a big increase in Turdidae as well as examples of *Phylloscopus collybita* and *inornatus*. "So the snow buntings may very well be of the same origin as the Greenland wheatears of previous days, for if they were Norwegian, they ought to have been more numerous at least from 30th."

it is under such conditions that the onwards flow of "off-passage" drift-migrants begins.

Discussion

It is clear that movement into western Europe of birds originating in the Greenland-Iceland sector may take place in almost any type of weather, except the kind which results in big falls of continental migrants in the British Isles. It need hardly be emphasised that attempts to correlate migratory movement with present weather at the point of arrival (and this has often been done) are useless: it is the immediate past weather along the route that is important in determining the course, and past weather in the area of departure to which we must look for the initial stimulus. These data, thanks to an excellent meteorological service, are now available to bird-migration students in the *Daily Weather Report* in a sufficiently accurate and detailed form to enable a reconstruction of many cases to be made.

It may seem a safe and indeed natural assumption that no bird setting out on a migratory flight can have fore-knowledge of the conditions it will meet with on the way; nevertheless, one hesitates to dismiss the matter without a closer examination, for the bird is a complex organism, and migration an elaborate and on the whole extremely successful phenomenon. When we summarise the foregoing records we find that three broad categories of approach can be defined, cyclonic, anticyclonic, and col. It does not appear that any given species shows an invariable preference for any particular category : white wag-tails may arrive at Fair Isle in conditions as extreme as dead calm and full gale, and such powerful flyers as swans and geese may use anticyclonic as well as cyclonic approach, to give but two examples.

Nevertheless, the weight of evidence from 1952 and previous seasons is biased in favour of passerine migration under col or anticyclonic conditions, and of goose migration in low pressure weather. It is more than likely, however, that this is due to a difference in migration time, the smaller birds moving early in the season when the Azores highs happen to be more strongly entrenched in the north-eastern Atlantic; and the swans and

geese later in the autumn when the highs have diminished and the " Icelandic low " which dominates winter weather in this portion of the globe has come into its own.

This suggests the possibility that natural selection may have exercised a part in establishing an earlier migration time among the passerines, poorly equipped as they are in view of their low body weight and lack of energy-building reserves to withstand a long cyclonic journey with its exposure to frontal disturbances, especially when this journey must of necessity take place across the sea. The most successful individuals and groups may well have been those whose earlier departure more frequently coincided with the optimum development of the Azores high, so that in the course of many generations these became the dominant groups in the population. As is well-known, small migrant birds leave their breeding-grounds long before the weather becomes too rigorous or the food-shortage acute, so that their migration anticipates by several weeks the inevitable famine of the northern winter. There has been much discussion as to why they do this (see, in particular, Landsborough Thomson, 1951) and although no clear reason is apparent, and, indeed, more than one factor of the internal and external environments may be concerned, it is not unlikely that the gradual deterioration of weather during the autumn has had a marked selective effect in adjusting migratory behaviour.

It might be argued that if this is true of the Atlantic maritime province, then one would need to postulate a different cause in the Eurasian continental region, since the climatic change is dissimilar in the two. Here too, however, the sub-tropical high of the Mediterranean basin is important, and it is at its fullest development in the late summer, declining afterwards. Late autumn over the Eurasian continent witnesses the increasing growth of the vast Siberian anticyclone, at the expense of the retreating sub-tropical high and the filling monsoon depression north of India, and its ramifications later extend over a large part of Europe. Late autumn and winter continental anticyclonic wind systems are colder and generally stronger (and therefore more conducive to excessive drift), and highs at this time are not infrequently characterised by temperature inversion in the upper layers which produces a heavy cloud-cover. The researches of

Kramer (1952) and Matthews (1951) on the importance of the sun in direction-finding among birds, suggest that such conditions would be detrimental to successful travel. We may fairly conclude that in both regions the sub-tropical high pressure developments of late summer and early autumn afford the optimum conditions for migration.

With regard to the geese, it may be that an earlier departure is precluded by the longer breeding-season and the need to complete the moult; or it may be that these heavier and stronger birds are better able to withstand the longer journey occasioned by a more round-about cyclonic approach to their wintering grounds. They may not be distressed to the same extent by passage through frontal disturbances, and they may even be able, at times, to fly above such weather. If need be, they can rest on the sea. The protracted nature of the merlin passage is interesting, and here migration may be adapted largely to the continual drain southwards of its food-supply.

As to the weather at the point of departure, this is obviously the most difficult factor to assess when one is studying migration at the " receiving-end ", so to speak. It is fortunate that some birds from the north-west are taxonomically distinguishable from their continental counterparts, and have a relatively restricted breeding-range. They are better subjects by far for research of this kind than stocks which are homogeneous over a very wide area. Nevertheless, it should be stressed that one can never be sure whether arrivals of such birds at Fair Isle in calm weather represent direct voyagers or birds merely moving on from an off-passage resting period somewhere along the route, although in the case of cyclonic migration the weight records of trapped birds are an important criterion. In this, as indeed in all the many facets of the present subject, the need is to continue accumulating raw data over a long number of years before any really satisfactory and final analysis can be made.

In previous papers (1952, 1953) I have put forward the view that the proximate external stimulus to migration is the absence of or the relative lack of wind. There are only one or two cases in the foregoing series of observations in which calms or light airs are not indicated at the presumed point of origin of the birds concerned. In these exceptional cases there is

evidence that departure may be influenced by improving weather conditions of rising barometer, clearing skies and moderating winds after a depression has passed through the area. Striking cases are the attempts of the white wagtails to leave Iceland on the last few days of August, culminating in the cyclonic migration of 1st-2nd September, and other instances are the merlin movement which followed and the goose and redwing immigrations at the end of October. The sudden amelioration of weather may well have a markedly stimulating effect on populations which are physiologically ready and keyed up for the journey, but have been held in check by the adverse conditions associated with the depressions.

The Meteorological Background

To return to the point that it seems unlikely that birds can have prescience of the conditions obtaining along the route, it is worth while observing that the anticyclonic weather initiating departure may have little or nothing to do with anticyclonic weather the bird meets with along its route. The cold, dense air of the Greenland highs has little in common (other than high barometric pressure) with the warmer, moister and less dense air of the subtropical Azores system and its north-eastwards extensions. Along the line of the polar front separating them, considerable interaction between the physical properties of the two air-masses goes on, leading to the formation of wave-depressions which subsequently develop according to the classic cyclone model of Bjerknes and Solberg. A full discussion of meteorological theory in relation to the behaviour of unlike air-masses can be found in such textbooks as Brunt (1944). Autumn 1952 witnessed the development of a number of these lows, often vigorous in their early stages in the Iceland-Faeroe region, and it is clear that even in a season of such a pronounced anticyclonic nature as 1952 there is the likelihood of frequent alternation between calm-weather and cyclonic approach, so that birds which leave Greenland under optimum conditions may be caught by low pressure weather before they have travelled very far. The redpoll influx of 5th-6th October appears to be such a case, and its converse is to be seen in the first big influx of Lapland buntings between 4th-6th September, which began as a cyclonic approach and

culminated in a calm-weather peak. Rapidly changing polar front situations are depicted in Figs. 2, 6, 7, 9, 10, and 11, and the southwards displacement of the polar front due to the unusual expansion of the Greenland high should be noted in Fig. 9.

We might enquire if the meteorological background supplies an answer to the problem of why different years sometimes produce entirely different patterns of autumn migration in our region. It would be hard to find two consecutive seasons as opposite in character, for example, as 1951 and 1952, the first with an almost continuous flow of continental migrants from the third week of August to the second week of November, and the latter with such migration at almost the lowest possible ebb. The correlation of the Fair Isle pattern with the north-eastwards extension of the Azores highs has already been remarked, but it is not clear at a cursory examination why such a situation should be peculiar to 1952.

Table 1 shows the number of days between 16th August and 30th September in the two years on which barometric pressure reached or surpassed 1,020 millibars over a considerable part of the regions named. The figures have been found partly by examination of the midday weather-maps, and partly from the diagrams of diurnal variations in pressure along a line drawn from Akureyri (Iceland) through maritime Europe to Marseilles (south France) published in the " Monthly Supplement " to the *Daily Weather Report* (nos. 416-7 and 428-9). Whilst there is little disparity between the figures for the southern sector, high pressure from the Azores belt having penetrated this part of the Continent to much the same extent in the two years, there are considerable differences between the northern and eastern sectors. Thus, the unusual activity of the Azores high-pressure system in the north-east Atlantic in 1952 is due to the extremely weak development in that year of the polar continental anticyclones, and it would appear that an early strengthening of the polar continental high is essential to a good migration season in maritime Europe. Good, that is to say, for the bird-watcher, but by no means good for the birds.

The impression we are left with from a comparison of the meteorological background of these two seasons is that the character of the migration in any particular autumn is entirely

dependent on the relative strength and activity of the chief air-mass sources—the maritime and continental sub-tropical and the continental polar highs—and the inter-play of the different physical properties of these air-masses along the fronts which separate them. The pattern of bird-migration is as unpredictable as the weather, and for the very good reason that the behaviour of the birds is very largely the behaviour of the medium in which they travel.

TABLE 1

NUMBER OF DAYS ON WHICH BAROMETRIC PRESSURE ATTAINED 1,020 MILLIBARS

Region	1951			1952		
	Aug. 15-31	*Sept.* 1-15	*Sept.* 16-30	*Aug.* 16-31	*Sept.* 1-15	*Sept.* 16-30
Northern						
Iceland	—	2	2	2	10	3
Faeroe	—	4	3	3	10	2
Scotland	—	4	5	5	7	1
Southern						
England	6	6	8	5	7	5
France	6	5	8	9	5	6
Eastern						
Finno-Scandia	6	4	6	—	5	—
N.W. Russia	10	3	5	—	—	—

Finally, it has been supposed, by myself among others, that in order to continue to exploit their arctic breeding-grounds in the north-eastern Atlantic the birds must have a strongly developed " preferred direction " or " standard direction " of movement to the south-east, and a faculty of orientation to get them to their destination. They may well have this power, but it would appear that in autumn, at any rate, they could quite well do without it. Conditions in spring will be different, and may demand such a faculty for the return flight: this migration should be studied. But success in the autumn could be explicable on the grounds that the north-eastwards flow of the maritime air-masses, whether they be highs or lows, is a concomitant of the west-to-east spin of the earth. When the Azores high pushes a tongue of air into the Icelandic Seas,

then the migrant's best route is a drift from Greenland in the westerly airflow on the north side of the ridge, or from Iceland and Faeroe with the southwards-moving airstream on its eastern perimeter. If the interaction of the warm sub-tropical and cold polar highs initiates a depression along the polar front, then undeniably the fastest route is a drift with the counter-clockwise current of the low. Movement in a " preferred " south-easterly direction would be safe enough in the calm air of a col, but it ought not to deposit Greenland wheatears (and snow buntings?) in Norway during a week of widespread anticyclonic weather, nor should it bring them back to Britain a few days later round a depression situated to the east of the British Isles.

The cases examined do suggest, very pointedly, that the migration out of the north-west is simply a down-wind drift. The greatest danger to these birds would appear to exist in an unusually strong development of the Greenland high at the expense of the Azorean system, as on 29th September (Fig. 9), for in such circumstances extensive westwards drift could result. Such occasions may account for the misdirection of Icelandic waterfowl to the American continent and the Azores. But the meteorological situation in this region in autumn is such that there can be very few days when birds leaving Iceland or Greenland would fail to make a landfall in western Europe somewhere between Norway (which would be exceptional) and the Mediterranean region (where ringed Icelandic ducks have been recovered), with the chances heavily weighted in favour of arrival in the British Isles. The power of orientation may be there, but on the economy of hypothesis one is led to conclude that these migrants have but to spread their wings, and drift, and they cannot go wrong.

Summary

The strong development of the Azores high pressure system in the north-eastern part of the Atlantic in early autumn 1952 created favourable conditions for a study of the migration into Britain of Greenland, Iceland and Faeroe birds.

The observed movements (mainly at Fair Isle) are chronicled under species headings—wheatear, white wagtail,

merlin, Lapland and snow buntings, redpoll, redwing and *Anseriformes*—and an attempt is made to correlate these movements, which were largely separate from those involving continental birds, with the prevailing weather conditions in the whole region.

A discussion of the migration data in relation to the meteorological background suggests:

(1) the possibility that the early timing of passerine migration is an adaptation to take the best advantage of the period of optimum development of the sub-tropical highs;

(2) that journeys are initiated by the calm weather conditions of col or anticyclonic weather, or by the sudden amelioration of weather following temporary inhibition of the migratory urge by a passing depression;

(3) that the different character of successive autumn migration seasons is a result of the varying dominance of the chief air-mass sources and the interplay of the anticyclones they produce;

(4) and that in the case of Greenland-Iceland populations a down-wind drift, without dependence on an innate sense of orientation, provides the surest method of reaching the western sea-board of Europe in autumn.

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A LIST OF SPIDERS OF THE COUNTY OF MORAY *

ROLAND RICHTER

Gordonstoun

THE following list is based on the county lists published by W. J. Bristowe in the *Comity of Spiders*, vol. 1 (1939), and the records of my own collecting in the years 1946–48. I am not aware of the existence of other records.

I have had no access to the sources from which Bristowe compiled his list, hence I do not give authors or date for any previous records. Unless printed in italics, they have been confirmed by myself. My knowledge of habitats and distribution is still so very incomplete that I refrain from giving details except in a few cases. New records for Moray are marked with an asterisk, and with two if they are new to Scotland.

Clerck's (1757) names have been used where they apply.

Dictynidae

Dictyna arundinacea L.
Dictyna major Menge.
* Dictyna pusilla Thor. Salt marshes.
* Ciniflo similis Bl.
Ciniflo fenestralis Stroem.

Oonopidae

Oonops pulcher Templ.

Dysderidae

* Segestria senoculata L.

Pholcidae

* Pholcus phalangioides Fuessl.
Gordonstoun House—an accidental introduction.

* *Received 8th December* 1952

Gnaphosidae

Drassodes lapidosus Walck.
Drassodes signifer C. L. Koch.
Zelotes pusillus C. L. Koch.
Micaria pulicaria Sund.

Clubionidae

Clubiona stagnatilis Kulcz.
Clubiona neglecta Cambr.
Clubiona diversa Cambr.
Clubiona reclusa Cambr.
* Clubiona lutescens Westr.
Clubiona trivialis L. Koch.
Clubiona compta C. L. Koch.
* Cheiracanthium erraticum Walck.
* Agroeca brunnea Bl. I have found egg cocoons only.
* Agroeca proxima Cambr.
Scotina gracilipes Bl.
* Zora spinimana Sund.
Zora nemoralis Bl.

Thomisidae

Xysticus cristatus Clerck.
Xysticus sabulosus Hahn.
* Xysticus erraticus Bl.
* Oxyptila atomaria Panz.
Philodromus aureolus Clerck.
* Philodromus aureolus var. cespiticolus Walck.
Tibellus parallelus C. L. Koch. Sand dunes.

Salticidae

* Salticus scenicus Clerck.
* Salticus cingulatus Panz.
Heliophanus flavipes C. L. Koch.
Neon reticulatus Bl.
* Evarcha falcata Clerck.

Lycosidae

Lycosa amentata Clerck.
Lycosa agricola Thor. River shingle.

* Lycosa purbeckensis F. Cambr. Salt marshes.
* Lycosa nigriceps Thor.
Lycosa tarsalis Thor.
Lycosa herbigrada Bl. or tarsalis var. herbigrada.
Lycosa pullata Clerck.
* Lycosa lugubris Walck.
Tarentula barbipes Sund.
Tarentula pulverulenta Clerck.
Trochosa terricola Thor.
* Arctosa leopardus Thor. Salt marshes.
Arctosa perita Latr.
* Arctosa cinerea Fabr. River shingle.
Pirata piraticus Clerck.

Pisauridae

Pisaura mirabilis Clerck.

Agelenidae

Cryphoeca silvicola C. L. Koch.
* Argyroneta aquatica L.
* Tegenaria atrica C. L. Koch. A colony at Elgin and a single female at Gordonstoun.
Tegenaria domestica L.
* Textrix denticulata Oliv.
Antistea elegans C. L. Koch.
Hahnia montana Bl.

Tetragnathidae

* Tetragnatha extensa L.
Pachygnatha degeeri Sund.
Pachygnatha clercki Sund.

Argyopidae

Meta segmentata Clerck.
Meta merianae Scop.
Cyclosa conica Pallas.
** Singa pygmaea Sund. Two colonies in coastal marshes.
Araneus diadematus Clerck.
Araneus cucurbitinus Clerck.
Araneus sturmi Hahn.

* Araneus umbraticus Clerck.
Araneus quadratus Clerck.
Araneus cornutus Clerck.
Araneus dumetorum Fourer.
* Zygiella x-notata Clerck.
Zygiella atrica C. L. Koch.

Theridiidae

* Episinus angulatus Bl.
Theridion sisyphium Clerck.
* Theridion simile C. L. Koch.
Theridion bimaculatum L.
Theridion denticulatum Walck.
* Theridion impressum L. Koch.
Theridion lineatum Clerck.
Pholcomma gibbum Westr.
* Steatodea bipunctata L. Not confined to houses.
* Asagena phalerata Panz.
Robertus arundineti Cambr.
Robertus lividus Bl.

Mimetidae

Ero furcata Vill.
Ero cambridgei Kulcz. I have found cocoons of a species of Ero.

Linyphiidae

Ceratinella brevis Wid.
* Ceratinella brevipes Westr.
* Blaniargus herbigradus Bl.
Lophocarenum parallelum Wid.
* Trichopterna thorelli Westr.
Minyriolus pusillus Wid.
Nematogmus obscurus Bl.
Silometopus curtus Sim.
Silometopus ambiguus Cambr.
Silometopus incurvatus Cambr.
Pocadicnemus pumilus Bl.
Tiso vagans Bl.
* Diplocephalus latifrons Cambr.

Savignia frontata Bl.
Araeoncus hiemalis Bl.
* Monocephalus fuscipes Bl.
Monocephalus castaneipes Sim.
* Thyreosthenius biovatus Cambr. Anthills of Formica rufa.
* Typhocrestus digitatus Cambr.
Troxochrus scabriculus Westr.
Colobocyba pallens Cambr.
Walckenaera acuminata Bl.
Wideria antica Wid.
Trachynella nudipalpis Westr.
Gonatium rubellum Bl.
Gonatium rubens Bl.
Hypomma bituberculata Wid.
** Hypomma cornuta Bl.
Gongylidium rufipes L.
Erigone dentipalpis Wid.
Erigone atra Bl.
Erigone longipalpis Sund.
Gongylidiellum vivum Cambr.
** Asthenargus paganus Sim.
Oedothorax fuscus Bl.
Oedothorax retusus Westr.
Peponocranium ludicrum Cambr.
* Maso sundevalli Westr.
Hilaira frigida Thor.
Phaulothrix hardyi Bl.
Porrhomma pygmaeum Bl.
Porrhomma pallidum Jacks.
Bathyphantes nigrinus Westr.
* Bathyphantes concolor Wid.
Bathyphantes gracilis Bl.
Poeciloneta globosa Wid.
Labulla thoracica Wid.
* Linyphia montana Clerck.
Linyphia triangularis Clerck.
Linyphia insignis Bl.
* Linyphia marginata C. L. Koch.
Linyphia hortensis Sund.
Linyphia peltata Wid.

* Linyphia pusilla Sund.
Stemonyphantes lineata L.
Tapinopa longidens Wid.
Bolyphantes alticeps Sund.
Bolyphantes luteolus Bl.
Leptyphantes expunctus Cambr.
Leptyphantes minutus Bl.
Leptyphantes alacris Bl.
Leptyphantes cristatus Menge.
* Leptyphantes obscurus Bl.
Leptyphantes zimmermanni Bertk.
Leptyphantes tenuis Bl.
* Leptyphantes flavipes Bl.
Leptyphantes ericaeus Bl.
Leptyphantes mengei Kulcz.
Leptyphantes moratus Hull. A doubtful species.
Drapetisca socialis Sund.
* Centromerus arcanus Cambr.
Centromerus bicolor Bl.
Centromerus bicolor concinnus Thor.
Centromerus prudens Cambr.
Macrargus rufus Wid.
* Oreonetides abnormis Bl.
Oreonetides firmus Cambr.
Mengea scopigera Grube.
Argyneta conigera Cambr.
Argyneta cauta Cambr.
* Microneta viaria Bl.
* Meioneta rurestris C. L. Koch.
Sintula cornigera Bl.

I am greatly indebted to Dr. A. F. Millidge and Mr. G. H. Locket for identifying my Linyphiidae and other spiders respectively, and to Mr. Bruce Forman for much valuable help in the preparation of this paper.

THE AUTUMN MIGRATION OF THE MEADOW-PIPIT AND THE SKYLARK ON THE KIRKCUDBRIGHT COAST *

D. F. Owen

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Between 16th September and 28th September 1952, I paid a series of visits to the Solway coast of Kirkcudbright in order to see the autumn departure of small passerines. Most observations were made at Southerness Point, which by its position is of considerable importance in the Solway migration system. My attention was first directed to Southerness by Mr. Arthur B. Duncan, and I am grateful to him for advice, also to Mr. David Cunningham for other assistance. A number of other coastal localities were visited and casual observations were made inland. Fig. 1 shows the upper

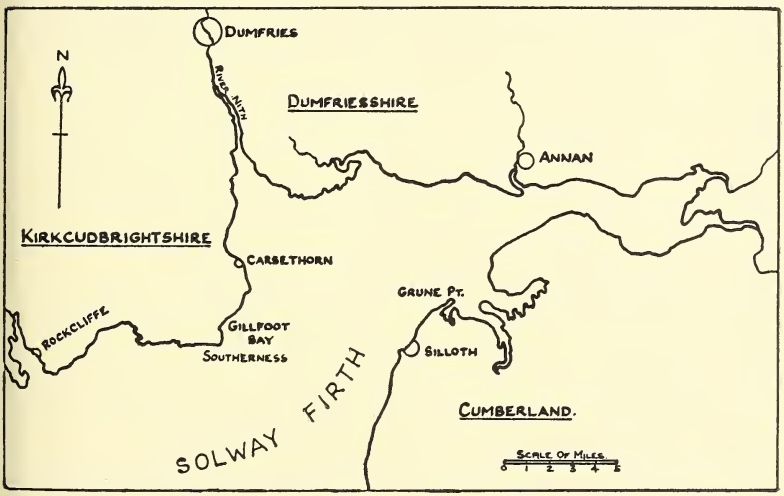

Fig. 1

Solway area and the main places mentioned. My observations never commenced before 9 a.m. (all times G.M.T.),

* *Received 13th January* 1953

and normally migration had almost ceased by noon. It is probable that the peak departures of certain species, which seem to take place just after first light, were missed. No migration occurred during strong winds of force 6 or above, but general weather conditions (apart from wind) had little effect on the migrating birds. The importance of Southerness as a place of autumn departures was apparent fifty years ago (Service, 1903), but precise details of directions taken by migrants were not given. The study of visible migration had not then been developed, for it was not until the work of Eagle Clarke (1912) became generally known that more detailed observations were forthcoming.

Movements of Meadow-Pipit

The autumn migration of the meadow-pipit *Anthus pratensis* takes place mainly during September, and by the end of the month most birds have left the breeding grounds. Gladstone (1910) states that the vast majority of meadow-pipits which breed in Dumfriesshire leave for the south by the end of September. It is therefore probable that the birds I saw at Southerness were a sample of the peak movement of this species in south-west Scotland. Figs. 2*a* and 2*b* show that the

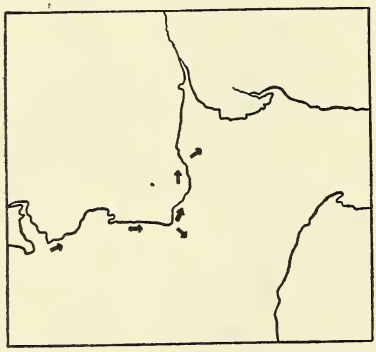

FIG. 2*a*

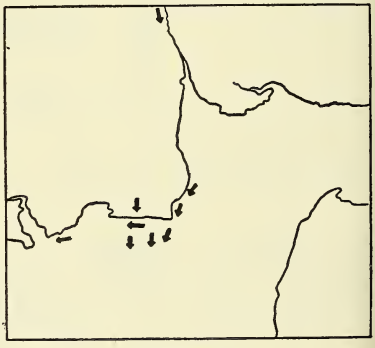

FIG. 2*b*

movements witnessed were of two distinct types, one of birds following the coast, and the other of birds setting out to sea.

Coasting pipits flew in two main directions. First, flocks were seen flying along the coast-line between Rockcliffe and Southerness in a general easterly direction. These were

often deflected north or south (as well as to points between) by the numerous bends in the coast-line. On reaching Southerness Point the parties split, and about half turned north to continue the coasting movement up to Carsethorn, where they crossed the Nith estuary to Dumfriesshire. The others set off out to sea in a south-easterly direction. These would eventually reach the coast of Cumberland south of Silloth, if the same direction was maintained throughout the crossing. These movements are shown in Fig. 2*a*. The coasting movement east was much more in evidence during days of easterly winds than days when the wind was westerly. My observations suggest that meadow-pipits prefer to migrate into a wind.

Secondly, there was a coasting movement which was essentially to the west. Parties of meadow-pipits passed south and south-west down the coast as far as Southerness. Here they divided in a similar way to the east-bound birds. About one-half continued on, after having been deflected almost due west; the remainder set out to sea in directions between south and south-south-west (Fig. 2*b*). If the same direction was maintained these birds would eventually reach land considerably to the south of the point reached by those which left in a south-easterly direction.

The movement south from Southerness was not made up entirely from coasting parties, for on certain days birds came overland from the north-west and flew straight out to sea. On 27th September this movement took place all day on a broad front in the Southerness region. Many of the birds were doubtless from the enormous flocks which had gathered in fields just inland from the Point, but others had travelled direct down from the hills.

Parties of pipits leaving the Point usually comprised about twelve birds each, but on the rush day of 27th September flocks of forty to fifty were frequent. However, flock size was not constant, and numbers varied between one and twenty on normal days.

After flying several hundred yards out to sea, many birds turned and came back. These in most cases set off for a second or third attempt, on each occasion gaining height. Birds leaving high over the water (*c.* 40 feet) rarely turned back.

A few birds, after making an initial unsuccessful attempt, returned and continued the coasting movement to the north or west. Standing at Southerness Point it was possible to see birds moving in all four major directions of the compass at once, as at times a continuous stream of returning birds (flying north) crossed those setting out for the south and those coasting in general directions east and west.

When leaving for the south meadow-pipits often had to migrate into a fresh cross-wind. In these conditions they maintained a southerly direction by directing their flight into the angle between the wind and the direction in which they were migrating. On 27th September, after two days of westerly gales, the peak migration was observed. Presumably many had congregated just inland during the rough weather, for on this day migration was witnessed until sunset, whereas normally few birds were seen after noon.

On three days parties of meadow-pipits were seen flying south over Dumfries. These presumably followed the river Nith down to the Solway.

Summarising, it would seem that the autumn movement of this species in the Solway is made up largely of birds travelling down the river valleys to the sea, where they coast east or west, and eventually leave at various headlands and points in a general southerly direction. It is possible that birds coasting west would take off for Ireland, and that some of these were immigrants from the continent which had already crossed the North Sea and northern England. Birds flying east probably turn to the south at points along the Solway where crossing places become progressively narrower further to the east. Blezard *et al.* (1943), writing of the spring migration of this species in Cumberland, state that continuous streams travel up the Solway to about Grune Point, where they leave for the north-east. This seems to be another example of the birds crossing at narrow points whenever possible.

Movements of Skylark

The autumn passage of the skylark *Alauda arvensis* takes place later than that of the meadow-pipit, and it is likely that the birds seen migrating on the Solway in September were

only the early individuals of a much larger movement. In general the main directions taken were similar to those of the meadow-pipit, but fewer birds were involved and none were seen to leave Southerness after flying overland from the fields behind. There were two main movements. First, a coasting one to the east, which, on reaching the Point, divided; half the birds flew out to sea to the south-east or east-south-east, while the remainder were deflected almost due north by the bend in the coastline. These birds then coasted on to Carsethorn, where they turned and crossed the estuary of the Nith to Dumfriesshire. The other movement was almost exactly opposite. Birds coasted in a general direction between south-west and south, and on reaching Southerness Point either flew out to sea to the south or south-south-west, or continued the coasting movement west. Figs. 3*a* and 3*b*

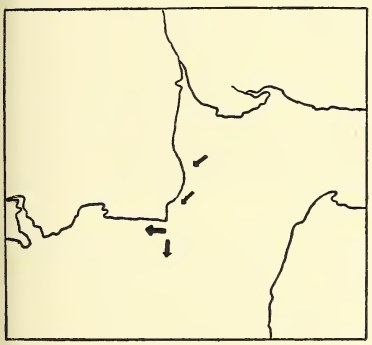

FIG. 3*a*

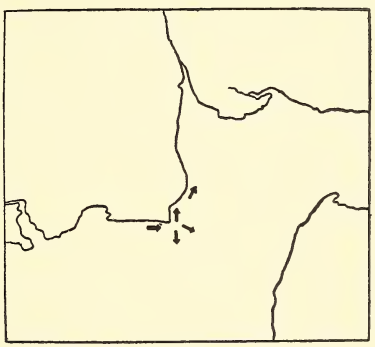

FIG. 3*b*

show these two movements and the ultimate directions taken by the coasting parties. Rather more birds set out to cross the sea on days with a wind of force 3 or less than during stronger winds. The flocks travelled between 10 and 40 feet above ground level when coasting and gained height when flying out to sea. However, a few flocks whose flight I followed out for several hundred yards dropped down to the level of the waves, and continued on with the characteristic flight of skylarks migrating across the sea. As with the meadow-pipit many birds which set out to cross the Solway turned back and made second or third attempts. Some of those which returned joined in with parties passing by along

the coast. Flocks of skylarks coasting in both directions often met at the Point. This seemed to cause some confusion, for the birds circled many times and eventually dropped down to rest in fields a little inland, where already large numbers had gathered. The parties of larks usually comprised less than a dozen, and single birds were numerous. The largest flock seen was thirty, which had crossed the Nith and then proceeded south along the coast at Carsethorn.

Other Species

Many swallows *Hirundo rustica* and some house martins *Delichon urbica* coasted east, and either turned north on reaching Southerness Point or set out across the Solway in a general southerly direction. These birds flew low over the water as they set off out to sea and never turned back as did the pipits and larks. Coasting parties followed most of the major bends in the coastline, but often some would cut across small points and bays. On reaching Carsethorn most flocks crossed the estuary of the Nith and presumably continued the coasting movement eastward. Twice I saw flocks of migrating swallows harried by a juvenile peregrine *Falco peregrinus* as they rounded Gillfoot Bay.

A few wagtails *Motacilla alba* left for the south from Southerness Point, and on 28th September a party of five were seen to turn back after flying several hundred yards out to sea. These did not attempt a second crossing, but joined the large flocks of this species and grey wagtails *Motacilla cinerea* on the shore around the lighthouse.

Other passerines seen near the coast included many robins *Erithacus rubecula*, song-thrushes *Turdus ericetorum*, starlings *Sturnus vulgaris*, wheatears *Oenanthe oenanthe*, linnets *Carduelis cannabina*, and a few tree-pipits *Anthus trivialis*, whitethroats *Sylvia communis* and blackbirds *Turdus merula*. Several merlin *Falco columbarius* and a few sparrow-hawks *Accipiter nisus* seemed to prey largely on migrant pipits and larks, the remains of which were found near the shore. It is possible that many of the birds seen along the shore between Rockcliffe and Carsethorn were night migrants. A few starlings did actually leave for the south from the Point, but soon returned

to the fields behind. As most diurnal-migrant starlings seem to set off about sunrise it is probable that some departures were missed.

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SCOTTISH TURTLE RECORDS PREVIOUS TO 1953 *

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Although turtles are usually associated with warm or tropical waters, they are occasionally stranded on our western and northern shores. In recent years several strandings have taken place, and when recording these it has been thought desirable to give a summary of the previous occurrences, since no single account is available.

Four species have been recorded from the British coasts, namely, the leathery turtle *Dermochelys coriacea* (L.); the hawksbill turtle *Eretmochelys imbricata* (L.); the Atlantic loggerhead turtle *Caretta c. caretta* (L.), and Kemp's loggerhead turtle *Lepidochelys kempii* (Garman). Of these, all but the first have been recorded from Scottish waters. As will be seen from the notes on the various strandings, however, the records of the hawksbill are suspect. One of the earlier identifications was later corrected, and in at least one case which I have handled the first identification was given as "hawksbill", though examination showed it was an Atlantic loggerhead.

Sibbald (1697, p. 193) seems to have been the first author to mention the stranding of turtles on our shores, where he records the occurrence of the hawksbill turtle in Orkney. This record is also quoted by Buckley and Harvie-Brown (1891, p. 265). Fleming (1828, p. 149; 1842, p. 42) states that he has reliable evidence of its having been found in Papa Stour, Shetland.

Two specimens came ashore in the southern Moray Firth in 1861 according to Sim (1903, pp. 197-198), one near Macduff in Banffshire, the other at Pennan, Aberdeenshire; and there seems to have been some confusion between the two. Sutherland (1861, p. 7795) refers to the Pennan animal as the one reported on by Edward (1861, p. 7713) and he corrected the identification from hawksbill to loggerhead. It seems certain

* *Received 14th February* 1953

that Edward never saw the Pennan specimen, and the one to which his note refers was the one stranded at Macduff, which he recorded as a hawksbill. I have reason to infer that this was also a loggerhead (see note on no. 3).

It would seem, therefore, that the definite occurrence of the hawksbill on the Scottish coast awaits confirmation, and the probability is that all the previous records refer to loggerhead turtles. However, one cannot be certain that all were Atlantic loggerheads, and Kemp's loggerhead may also have been included.

For an account of turtles in general Carr (1952) may be consulted.

In compiling this account I am indebted to Dr. H. W. Parker, British Museum (Natural History), for comments; also to him and to Mr. William Hood, Paisley Museum, for the particulars of no. 13; to Dr. Bennet B. Rae, Fisheries Division, Scottish Home Department, for the particulars of nos. 8 and 11; to Professor V. C. Wynne-Edwards for the particulars of no. 4; to Miss Jeannie Mitchell, Melbourne University, for her observations on no. 3.

Chronological List of Strandings

1.	(Before 1828)	Orkney; Shetland	Species indeterminate
2.	—.11.1829	Southerness, Kirkcudbright	Species indeterminate
3.	29. 7.1861	Macduff, Banffshire	Atlantic loggerhead
4.	1. 8.1861	Pennan, Aberdeenshire	Atlantic loggerhead
5.	22. 8.1861	Loch Lomond, Dunbartonshire	Species indeterminate
6.	26.11.1898	Vallay, North Uist, Outer Hebrides	Atlantic loggerhead
7.	13.12.1923	Dunvegan, Skye	Atlantic loggerhead
8.	*ca.* 22.10.1928	Loch Seaforth, Lewis	Species indeterminate
9.	13.12.1945	Unst, Shetland	Atlantic loggerhead
10.	13. 2.1946	North Uist, Outer Hebrides	Atlantic loggerhead
11.	—. 8.1947	Off Sanda, Firth of Clyde	Species indeterminate
12.	2.10.1949	Kinlochbervie, Sutherland	Kemp's loggerhead
13.	27.12.1949	Troon, Ayrshire	Kemp's loggerhead
14.	4.12.1951	Girvan, Ayrshire	Atlantic loggerhead
15.	30. 9.1952	Lochinver, Sutherland	Atlantic loggerhead

Notes on specimens

A. Species Indeterminate

No. 2. Kirkcudbright

Cast ashore alive in November 1829 at Southerness, a village on the Solway in south-east Kirkcudbrightshire. It was

sent to a Dumfries innkeeper to be made into soup, but unfortunately the species was not determined (Service, 1896, p. 175; 1902, p. 210). Since it was considered worth while sending away for the purpose of making soup, it was presumably a well-grown specimen.

No. 5. Loch Lomond

Found alive on 22nd August 1861, on the beach near Rowardennan Lodge on Loch Lomond (Smee, 1861, pp. 351-352; Sutherland, 1861, p. 7795). It was a small animal, the length being only 11½ inches. At the time the water was very high, being about eight feet above normal, and the turtle possibly reached the loch by swimming up the River Leven.

No. 8. Loch Seaforth

Washed ashore alive in Loch Seaforth on the east coast of Lewis about 22nd October 1928. The measurements given at the time were: 3 feet 9 inches from the tip of the snout to the tip of the tail; carapace 2 feet 9 inches in length and 2 feet 3 inches in breadth. The weight was about 170 lb. The occurrence was reported to the then Fishery Board in Aberdeen, and there seems to have been some correspondence with the Royal Scottish Museum also. Unfortunately the specimen was not secured by either department for examination nor, so far as can be traced, was it identified by a competent zoologist. The suggestion in the correspondence that it was a green turtle cannot be taken as a satisfactory identification.

No. 11. Firth of Clyde

An unidentified turtle was seen by the crew of a Campbeltown fishing vessel in a position 5 miles off Sanda Island, Firth of Clyde, in August 1947. It swam close to the vessel so there was no doubt about the identification. It was estimated to be about 4 feet in length. The occurrence was reported in the *Fishing News* of 23rd August 1947, p. 8.

B. Atlantic Loggerhead Turtle

Caretta c. caretta (L.)

No. 3. Macduff

Caught alive in a stake-net at Greenside, near the promontory called Gamrie Mhor, Macduff, on 29th July 1861, and examined by Edward (1861, p. 7713). The carapace was 15 inches in length and 10 inches in breadth. The specimen was presented to the Burgh Museum, Banff, by the Earl of Fife. It was identified by Edward as a hawksbill, but there seems to be reasonable doubt about this identification. In the first place, the other turtle (no. 4) stranded about the same time was also an Atlantic loggerhead. In the second place, in a rearrangement of the Burgh Museum in 1952 a small unlabelled turtle was found, which may reasonably be inferred to be the one described by Edward as the sizes correspond. It was unfortunately destroyed, but Miss J. Mitchell, who saw the specimen before its destruction, writes that the plates were not overlapping as in the hawksbill and that the animal was, without doubt, a loggerhead, as is evident from Edward's description.

This record is also quoted by Harvie-Brown (1895, p. 231), but under different scientific and popular names.

No. 4. Pennan

Taken alive in a salmon net at Pennan, Aberdeenshire, on 1st August 1861, and presented to the museum of the Natural History Department of Aberdeen University, where a small turtle, presumed to be this specimen, is still preserved. It was seen and identified by Sutherland (1861, p. 7795), who gave no dimensions but its weight, which was 25 lb. This specimen was more fully described by Dyce (1861, p. 351), who gave the length of the carapace as $19\frac{1}{2}$ inches. Professor Wynne-Edwards refers to an unlabelled specimen in the Aberdeen University museum 17 inches in length, and calculates that, on the ratio given by Carr between length and weight, the latter would work out at about 28 lb., so there seems little doubt that this is the Pennan animal.

No. 6. Vallay, North Uist

This animal, apparently just dead, was found on the shore of the island of Vallay, North Uist, Outer Hebrides, on 26th November 1898 (Peel, 1899, p. 115; Peel, 1901, p. 4; Ritchie, 1924, p. 165). It was a very young example, the carapace being only $6\frac{1}{4}$ inches in length and $5\frac{3}{4}$ inches in breadth, both measurements being taken along the curve. Peel, *vide supra*, was told that large specimens had been frequently washed up in the vicinity, but, since no one had recorded the fact, doubted the accuracy of the statement.

No. 7. Dunvegan

Found alive on the shore at Pool Roag near Dunvegan, Skye, on 13th December 1923. It was a very large specimen weighing 309 lb.; the carapace was 2 feet $7\frac{1}{2}$ inches in length. This animal was very fully described by Ritchie (1924, pp. 99-103). It was preserved and mounted in a natural habitat case in the reptile gallery, Royal Scottish Museum, where it is still exhibited (Reg. No. 1925, 101).

No. 9. Unst

Found alive at Collister beach on the west side of Unst, Shetland, on 13th December 1945. This was a small specimen, the carapace measuring $8\frac{5}{8}$ inches. Preserved in the Royal Scottish Museum (Reg. No. 1946, 8).

No. 10. North Uist

Found alive on the shore on the west side of North Uist, Outer Hebrides, on 13th February 1946. This was a small animal, the carapace measuring 7 inches in length. It was presented by Mr. C. J. M. Cadzow to the Royal Scottish Museum, where it is preserved (Reg. No. 1946, 9).

No. 14. Girvan

Found alive on the beach at Girvan, Ayrshire, on 4th December 1951, and kept by Mr. A. S. Grant, Doune Schoolhouse, till the 14th of that month when it died. Mr. Grant kindly presented the specimen to the Royal Scottish Museum, where it is still preserved (Reg. No. 1952, 1). The animal was a small one, the carapace being 9 inches in length.

No. 15. Lochinver

Found dead on the sea shore near the village of Stoer, near Lochinver, Sutherlandshire, on 30th September 1952. The animal was comparatively small, the carapace measuring 13½ inches in length. The weight was given as 12 lb. In the possession of Mr. Aird, Lochinver.

D. Kemp's Loggerhead Turtle

Lepidochelys kempii (Garman)

This species has been recorded only twice from the Scottish coast, both strandings taking place in the autumn of 1949.

No. 12. Sutherland

Found alive at Loch Clash, by Kinlochbervie, Sutherland, on 2nd October 1949. The carapace measured 11½ inches in length. This would appear to be the first authentic record from Scotland, although it had been previously recorded from the English coast. The animal was presented by Mr. R. Neilson, Kinlochbervie, to the Royal Scottish Museum, where it is preserved (Reg. No. 1950, 1).

No. 13. Ayrshire

Washed ashore, alive, at Troon, Ayrshire, on the 26th December 1949, during very stormy weather. The carapace length was 8½ inches and the breadth 7¾ inches. The animal was 12¼ inches from the beak to rear tip of carapace. The specimen is preserved in the Museum and Art Galleries, Paisley (Reg. No. 18/1949).

The records of turtles are so few that it is impossible to draw any wide conclusions. In the past hundred years, they seem to have centred round four periods, namely 1861, 1898, the 1920s, and from 1948 onwards. Since these animals are pelagic, their appearances may be due to a change in flow of the North Atlantic Drift or a change in its direction relative to our coasts.

It may be noted, however, that the years of stranding for Scotland do not necessarily coincide with those of England.

For example, in the winter of 1938-39 there were ten strandings in the south, but none in Scotland, either that winter nor for several winters on either side (Parker, 1939, pp. 127-129).

A point of interest is in the size of the animals. Those stranded in 1861, 1898 and from 1948 have all been juveniles, but the three reported in 1829, 1923, and 1928 were adults.

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REPORT ON BIRDS OF THE CLYDE AREA, 1952*

Compiled by M. F. M. Meiklejohn and C. E. Palmar
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In this, our third report of its type, we continue to publish bird records from the Clyde area which we consider worthy of permanency. Although we confine ourselves here to unusual observations, we are still collecting other material, notably on the breeding distribution of birds within the area: material of this type is being filed and is already of considerable bulk and importance.

It seems to us that a large number of valuable observations are being made annually which never see the light of day, and we would beg readers of this report, if they will be so kind, to send us any ornithological observations of interest which they may make within the Clyde watershed in future years.

We would like to thank those who have helped us in our work. Those whose records are published in the present report are:

Miss E. R. Brock, A. G. S. Bryson, Miss W. U. Flower, A. G. Gordon, Ian Hay, Nicol Hopkins, Cdr. G. Hughes-Onslow, G. Kerr, Miss M. I. Kinnear, E. Licence, I. K. McTavish, H. Mayer-Gross, W. Kenneth Richmond, G. L. Sandeman, David Stephen, S. D. Stevenson, Rev. E. T. Vernon and the compilers. All dates, unless otherwise stated, apply to 1952.

Little Grebe *Podiceps ruficollis*. Hamilton, 15th September, the exceptional congregation of over ninety birds was seen on the rubbish-dump (A. G. S. B., G. L. S.). Fifty-eight were there on 7th September (C. E. P.) and forty on 30th September (M. F. M. M.).

Leach's Petrel *Oceanodroma leucorhoa*. The wreck of this species, occurring along the west coasts of Britain, was seen to particular advantage by M. I. K. on the Ayrshire coast. Living birds were first observed—seven occurring at Stevenston on 29th October. On 2nd November dead birds began to be

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washed up, no fewer than seventy-four having been found by W. U. F. and M. I. K. on a 3-mile stretch of shore at Barassie ; other dead birds found included one red-throated diver, one redshank, three oiled guillemots and one razorbill.

Glasgow Museum received nine specimens from different parts of the Clyde area, and we have twelve other records from various localities (C. E. P.).

Storm Petrel *Hydrobates pelagicus*. Stevenston shore, 3rd November, one found dead, at the same time as the wreck of Leach's petrels (M. I. K.).

Cormorant *Phalacrocorax carbo*. A bird observed at Largs on 16th March had the sides of the neck completely of a greyish-white colour, thus resembling in appearance birds of the southern race *sinensis* (M. F. M. M.). A similar bird was seen at Girvan on the following day, 17th March (G. H.-O.); the observer notes that this bird " in full plumage, including breeding-patches, but with greyish-white head, must surely have been of the southern race ". Whilst it was noticed, on 7th April, that breeding birds on the south Ayrshire coast were nearly as white on the neck as the Largs bird and much whiter than usual birds of the typical race, the coincidence in dates of the two observations above is remarkable, and agrees well with the date of a similar bird seen on the Isle of May on 8th March 1953 (J. H. B. Munro *in litt.*).

Inland records of cormorants include one at Hamilton, 7th September, and two at Loch Coulter, 5th October (C. E. P.).

Gadwall *Anas strepera*. Richmond Park, Glasgow, 9th October, one ♂ (N. H.).

American Wigeon *Anas americana*. Bothwell Bridge, 16th April, one ♂ (A. G. G.). The observer, who is familiar with the species in captivity, gives the following notes : " Pale forehead—paler than in wigeon—practically white. Green head marking not strongly defined. General head colour, grey and green. General body colour, browny-purple Rest of plumage and actions as wigeon, but possibly slightly thicker-set."

Scaup *Aythya marila*. Hamilton, 15th September, two ♂♂ (A. G. S. B., G. L. S.). Ardrishaig, Loch Fyne, 12th June, a flock of about thirty (E. L., C. E. P.).

Velvet Scoter *Melanitta fusca.* Stevenston, 20th to 22nd May, one (M. I. K.).

Smew *Mergus albellus.* Hamilton rubbish-dump, 11th January, a red-headed bird (M. F. M. M.). Mouth of R. Endrick, Loch Lomond, 22nd November, a red-headed bird (M. I. K.).

Sheld-Duck *Tadorna tadorna.* Bothwell Bridge, 11th March, two pairs; this record compares interestingly with records made at the same place in mid-March 1950 and 1951 (*Scot. Nat.*, 64: 28). Bothwell Bridge, 17th and 18th April, one (M. F. M. M.).

Hen-Harrier *Circus cyaneus.* A pair were successful in rearing young in the area in 1952 (C. E. P.). West Renfrewshire, 22nd June, one ♀ or imm. (W. U. F.). Gartocharn (Dunbarton), 26th October, one adult ♂ (M. F. M. M.).

Quail *Coturnix coturnix.* Luggiebank (between Cumbernauld and Airdrie), July 1949, one was calling for two or three days (D. S.). Beside Penwhapple Loch, Ayrshire, 14th December 1947, one flushed by dogs (G. H.-O.). Maidens, Ayrshire, end of November 1952, one seen by Mr. Logan Dunlop, who gives an accurate description of the bird (G. H.-O.).

Water-Rail *Rallus aquaticus.* In early February, in heavy frost, numbers were seen in an unfrozen ditch at Possil; six on the 1st (M. F. M. M.) and eight on the 3rd (M. I. K.). 28th November, one on the road between Craigmaddie and Mugdockbank (Dunbarton) (M. I. K.).

Corncrake *Crex crex.* This species appears to have been numerous in 1952: we have records of calling birds from Ayrshire (Barr, eight; Ballantrae, three); Renfrew (Balgray; Bridge of Weir—two pairs on a farm where there is usually only one; Pollok golf course); Dunbarton (Milngavie, two; Gartocharn; Vale of Leven, two); and Argyll (head of Loch Fyne). In the Barr area of Ayrshire it was " more numerous than for many years " (G. H.-O.).

Oystercatcher *Haematopus ostralegus.* Fairlie, 16th March, an almost complete albino was seen. It had faint brown marks only on top of the head, on the throat, nape and shoulders. Its bill was of a much paler red than those of the normal oystercatchers along with it (M. F. M. M.).

Black-tailed Godwit *Limosa limosa.* Hamilton, 20th April, five observed feeding in a shallow pool (G. K.).

Ruff *Philomachus pugnax.* Balgray, 28th September, one ♂ imm. (C. E. P.).

Grey Phalarope *Phalaropus fulicarius.* Ian Wood, a well-known writer on natural history, informs us that during the winter 1951-52, after a week of gales, he had good views of a bird of this species on Loch Lomond: he saw it standing at the edge of the water and flying. He immediately identified the bird from books and, later, unhesitatingly picked out a grey phalarope in winter plumage in the Glasgow Museum collection as being the bird he saw. This may have been at the same time that a bird of this species was seen after gales in Fife (*Scot. Nat.*, 64: 57).

Red-necked Phalarope *Phalaropus lobatus.* Ballantrae, 31st October, one observed at the time of the Leach's petrel wreck (S. D. S.). Full details of identification have been sent to the editor of *The Scottish Naturalist.* A bird of this species was seen in Staffordshire at the time of the petrel wreck (G. W. Rayner *in litt.*).

Arctic Skua *Stercorarius parasiticus.* Stevenston shore, 12th June, one flying north (M. I. K.).

Scandinavian Lesser Black-backed Gull *Larus fuscus fuscus* or *intermedius.* Bothwell Bridge, 1st December 1951 a very dark-backed bird of this species was seen. The bird was seen in excellent light through a telescope: its yellow legs were clearly visible and herring gulls were present for a comparison of size (W. K. R.).

Iceland Gull *Larus glaucoides.* The bird which has haunted Hamilton rubbish-dump more or less continuously since December 1949, continued to do so until the middle of December 1952, since when it has not been seen there. In its third winter the bird's bill became yellower in colour and on 8th April was like that of an adult, yellow with a red band: its plumage, however, did not noticeably change, remaining pure white with inconspicuous brown specklings on the shoulders (M. F. M. M.). Canniesburn, mid-March, one imm. in "pink" plumage. Slender bill and long wings noted. Observer familiar with both Iceland and glaucous gulls. There

was a considerable northward movement of gulls at the time (W. K. R.).

Little Auk *Plautus alle.* Stevenston, 7th January, a newly dead bird picked up (M. I. K.).

Hoopoe *Upupa epops.* Hunter's Quay, Argyll, 13th April, one watched on his lawn by Mr. T. McGill (*per* E. T. V.), who identified the bird from plates in books. He describes its " cinnamon-pink plumage . . . barred across the wings, lower back and tail, with black and white . . . it had a long thin bill ".

Willow-Tit *Parus atricapillus.* Bothwell Bridge, 27th January, one (C. E. P.).

Lesser Whitethroat *Sylvia curruca.* Richmond Park, Glasgow, 22nd September, one (N. H.). The observer, who is familiar with the species in England, watched the bird at close quarters for some minutes.

Pied Flycatcher *Muscicapa hypoleuca.* We have records of the presence during the breeding season of seven birds—six of them ♂♂—from the northern limits of our area.

White Wagtail *Motacilla alba alba.* On spring passage reported as follows:—Stevenston, five on 17th, one on 18th, one on 24th April, and two on 5th May (M. I. K.); Ballantrae, two on 27th April; Hamilton, one on 2nd May (M. F. M. M.).

Snow-Bunting *Plectrophenax nivalis.* Ben Vorlich, 29th December 1951 a flock of about fifty between 2,000 and 2,500 feet (W. K. R.). Stevenston shore, 23rd to 30th January, a flock of more than sixty, as well as other pairs (M. I. K.). West Kilbride, 27th January, one (M. F. M. M.). Lennoxtown (W. Stirling), 7th January, one found dead (I. K. McT., H. M.-G.).

Tree-Sparrow *Passer montanus.* Balmore (W. Stirling), 14th March, several, in a flock of finches (M. F. M. M.).

ZOOLOGICAL NOTES

Rare Invertebrates recently found in the Scottish Area. —This summary covers the period from November 1950 to February 1953, and deals with the rarer invertebrates taken during that period, with the exception of *Palinurus vulgaris*, the spiny or thorny lobster, a full list of the Scottish records to date for that species having been recently published by Wilson (*Scot. Nat.* (1952), 64: 151-157).

Some of the records have been received at the Royal Scottish Museum, others at the Scottish Home Department's Marine Laboratory, Torry, Aberdeen. To Dr. Bennet B. Rae and to Mr. E. Wilson I am indebted for a summary of these latter records, which are marked (R. & W.). To Professor A. D. Peacock and Mr. Whaterhouse, University College, Dundee, I am indebted for the particulars of the *Architeuthis* stranded at Easthaven, and to Dr. I. Gordon, British Museum, for the confirmation of record number 1.

Paramola cuvieri (Risso)

1. A female of this rare crab was found about 4th January 1951 at Stromness, Orkney, along with a specimen of the northern stone-crab (*Lithodes maia*). In this species the female is much smaller than the male, and the measurements now given contrast strongly with those previously given for Scottish specimens. The length of the carapace, including the rostral spine, was only $3\frac{1}{2}$ inches, and that of the right cheliped only $5\frac{5}{8}$ inches. This specimen, kindly forwarded by Mr. J. C. Marwick for identification, is now in the Stromness Museum.

2. A male was taken by a trawler 75 miles N.E. by N. from the Out Skerries, Shetland, in 105 fathoms in April 1951 (R. & W.).

3. An adult-sized specimen was brought up on a great line fished from the M.V. *Star of Bethlehem*, approximately in position 45 miles N.N.W. from the Butt of Lewis, about 25th September 1952 (R. & W.).

Sepia officinalis Lam.

4. A specimen was caught by seine net 16 miles E. by S. from Buchan Ness in 62 fathoms on 16th November 1950 (R. & W.).

5. Another specimen was also taken by seine net 5 to 6 miles E. to S.S.E. from Fetlar on 20th December 1950. Shetland fishermen reported the presence of this species in numbers in this area from about mid-December 1950 (R. & W.).

6. Mr. Charleson, writing from Hillswick, Shetland, on 27th August 1951, stated that numbers of cuttle-bones were to be found in certain places at that time, but no live animals had been seen.

7. The presence of cuttle-bones was reported by Dr. H. Wood, Deputy Director, Scottish Home Department, Marine Laboratory, Aberdeen, from Sandend Bay, Moray Firth, in July 1951. During casual visits Dr. Wood saw several damaged cuttle-bones and, on a later occasion, two undamaged specimens which, therefore, seemed to have been only very recently cast ashore. A local resident informed Dr. Wood that a lot of these cuttle-bones had been seen during 1951 (R. & W.).

Ommatostrephes sagittatus Lam.

8. In the spring of 1951, a large invasion of this squid took place along the east coast of Scotland from Aberdeen to Berwick, with the main bulk of the records coming from the Firth of Forth. The earliest record was on 10th February and the last on 10th March, but almost all the strandings occurred between 23rd and 27th February. A full account of this invasion will appear as a separate contribution by Mr. A. S. Gillespie, Loretto School, Edinburgh.

9. Two specimens, which link up with this main invasion, were found on the beach at Aberdeen, near the Bathing Station, on 2nd March 1951 (R. & W.).

Stenoteuthis caroli Furtado

10. On 12th January 1952, a specimen was washed ashore alive on the beach at Portree. It was secured after a struggle by Constable Ian Morrison, and is now in the Royal Scottish Museum.

11. A second record for this species for the period is the specimen secured alive at Gardenstown, Banffshire, on 16th February 1953 and forwarded to the Museum by Dr. Rae. It was rather smaller than the usual run of these specimens, the ventral mantle length being only 22½ inches (R. & W.).

Architeuthis harveyii Verrill

12. This specimen was washed ashore east of Easthaven, Angus, on 14th December 1951, in a damaged condition and in an inaccessible place. Before it was found it had also been mutilated. The mantle length, anterior edge to the posterior tip, was 4 feet 9 inches, and the head projected 1 foot 9 inches from the mantle. The portions secured for examination were the jaws and radula, and a small piece of one of the short arms with a few suckers. These all agree with Verrill's description of this species.—A. C. Stephen, Royal Scottish Museum, Edinburgh.

Some Rare British Syrphidae (Diptera) in the Royal Scottish Museum.—Through the kindness of Mr. A. R. Waterston, O.B.E., I was recently able to study the British Syrphidae in the Royal Scottish Museum. Besides a large amount of incorporated material, the recently acquired collection of Scottish Syrphidae made by the late Mr. H. A. Latham was available for me to examine. As a result of my visit, much useful additional data about distribution, etc., has been incorporated in the Syrphidae volume of the *Handbooks for the Identification of British Insects*.

I was particularly gratified to find over the name-label of *Callicera aenea* Fabricius a very fine female example of *C. spinolae* Rondani, taken at Southwold in Suffolk on 1st October 1928 by Mr. J. W. Bowhill, the Scottish entomologist. Only two other examples of this strikingly handsome fly have been recorded as taken in Britain, both by the late Mr. Claude Morley. Morley's original capture was a female taken on 10th September 1942 in the marshes of the River Deben at Brandeston in Suffolk, on *Angelica* blossom. The second example, also a female, was taken on ivy blossom on 11th September 1947 in his garden at Monks Soham in Suffolk. Morley describes these two noteworthy captures at some length in his own entertaining style in the *Transactions of the Suffolk Naturalists' Society* (1942, 5 (1) : 14-15 and 1947, 6 (2): 149-150). The specimen taken by Bowhill is the largest example of the species that I have seen, the wing length (measured with dividers from the basicosta to the wing-tip) being 15 mm. The wing length of examples previously examined ranged from 12-14·25 mm.

Another interesting discovery was that of four examples of *Neoascia obliqua* Coe in the series of the common *N. podagrica* Fabricius, one of these specimens being in the main collection, and the remaining three in the Latham collection. From this further material, it seems possible that in Britain the range of the species is mainly confined to central and south Scotland, the only British record outside this area being that of a single male taken by G. H. Verrall on 2nd May 1868 " nr. Darenth, Kent ". The localities of the Scottish material of *obliqua* are as follows: Perth (Bridge of Cally), Fife (Lundin Links), Renfrew (Erskine), Lanark (Gorge of Avon), and Edinburgh (Blackford Hill).

My attention was drawn by Mr. Waterston to eight Irish examples of *Arctophila fulva* Harris (= *mussitans* Fabricius) in the main collection, in which the long dense hairs on the tergites are greyish, with only a trace of yellowish hue, instead of being completely yellowish as in all other examples of the species that I have examined. In most of these Irish specimens the basal corners of

the second tergite bear blackish hairs. The remaining Irish examples that I have seen were taken by me at Naas in Co. Kildare, and have all the tergites yellow-haired as usual. The specimens in the Royal Scottish Museum are from Counties Donegal, Down and Wicklow. Further collecting of the species in Ireland will establish which is the prevalent form there.

Among the interesting Syrphidae in the Scottish national collection are two specimens of the rare *Cynorrhina fallax* Linnaeus, a species apparently confined in Britain to the Scottish Highlands. These examples were taken by J. W. Yerbury at Aviemore in Inverness-shire, the previously recorded localities for this species being Logie in Morayshire, Spey Valley in Inverness-shire and Braemar in Aberdeenshire.—R. L. Coe, British Museum (Natural History).

New Records of Spiders from West Ross.—From a small collection of spiders taken over a period of a year, at the Nature Reserve at Beinn Eighe, West Ross, twenty species have been identified which have not apparently been recorded for the county before. The county list followed is that given by Bristowe (*The Comity of Spiders*, vol. 1, London, 1939). The Reserve covers about 10,500 acres, and the altitude ranges from 40 feet to over 3,000 feet. The habitats vary from sheltered woodland (mainly pine, with some birch) with deep ground cover, to very exposed bare rock.

I am very much indebted to Mr. J. H. Murgatroyd, of Bournemouth, for his great help in checking and naming the specimens, and also to Captain Diver for his helpful criticism.

The list of species new to the county (all from vice-county 105 West Ross) is as follows: —

Clubionidae

Zora spinimana Sund. On ground, in the wood.

Thomisidae

Tibellus oblongus (Walck.). In deep heather on low ground.

Salticidae

Neon reticulatus Bl. Fairly common in wood, under rotten bark.

Lycosidae

Lycosa pullata Oliv. Probably widely distributed on Reserve, and numerous. Generally found running on wet ground in open, ground cover short.

Tarentula pulverulenta Clk. One specimen taken at about 1,500 feet on north-east shoulder of Beinn Eighe, ground cover short and sparse.

Tetragnathidae

Tetragnatha montana Sim. Found in various parts of the Reserve on heather, or over small pools. Generally at a low altitude.

Argyopidae

Cyclosa conica Pall. Low ground in the wood, on deep heather. One specimen.

Araneus umbraticus Clk. One specimen taken from under bark of dead stump. Altitude about 40 feet.

Linyphiidae

Blaniargus herbigradus Bl. From ground in wood.

Thyreosthenius becki Cambr. On ground at about 1,700 feet (Coire mhic Fhearchair, outside west boundary of Reserve), and also in the wood at under 100 feet.

Wideria capito Westr. In the wood, and at Coire mhic Fhearchair under stones on bare rock (Torridonian Sandstone) at about 1,700 feet. Sheltered habitat near loch; locally numerous.

Trachynella nudipalpis Westr. From ground in wood.

Labulla thoracica Wid. On cliffs at about 800 feet, behind wood, and in the wood.

Linyphia triangularis Clk. In deep heather in the wood.

Lepthyphantes alacris Bl. In the wood.

Lepthyphantes obscurus Bl. In the wood.

Lepthyphantes pallidus Cambr. In the wood.

Lepthyphantes ericaeus Bl. In the wood.

Lepthyphantes tenebricola Wid. In the wood.

Macrargus rufus Wid. In the wood.

It is perhaps worth noting that, although the Linyphid *Wideria capito* is to be found at the higher altitudes under loose slabs of rock, particularly at the Coire mhic Fhearchair, there are some places where this habitat is occupied by another species, the Dysderid *Segestria senoculata* L.: in my preliminary observations the two species were not found together in the same place. Both, however, occur in the wood, but there they seem to occupy different habitats. —Ann R. Gordon, The Nature Conservancy, Edinburgh.

Red-throated Diver in Midlothian in June.—On 8th June 1952 a red-throated diver *Colymbus stellatus* was present at Gladhouse

Reservoir, Midlothian. It was first seen in flight over the water at a height of about 100 feet (when it was possible to identify the species with certainty) and it was kept under observation for about a quarter of an hour. During this period it circled steadily to gain height till almost lost to sight at an estimated 2,500-3,000 feet. It then made off for the south-west but turned back after covering about half a mile and was eventually lost to sight, still at a considerable height over the reservoir.

The date is a strange one for this part of Scotland, but the only other diver seen in the course of weekly visits to Gladhouse Reservoir over the past three years was at much the same time of year—a black-throated diver on 2nd July 1951.—D. G. Andrew, Edinburgh.

We have several times seen red-throated divers, sometimes several together and all in summer plumage, up to and after the middle of June on the Aberdeenshire coast, between Aberdeen and Newburgh—a favourite stretch of coast for these birds throughout the winter and spring.—Editors.

The Fulmar's Bill.—One is not surprised to learn that the bill of a particular bird, due to natural selection, is exactly adapted to the niche within which the bird lives, but it is surprising to find that a bird, which at times lives in widely different niches, should have a bill equally well adapted to each of them. Such may be claimed for the bill of the fulmar petrel *Fulmarus glacialis* and such may very well have a direct bearing on the bird's remarkable success in life. The fulmar's bill is a complex structure markedly different from the bills of gulls and others which live largely in the same environment, and the measure of the difference is possibly the measure of the fulmar's advantage over these birds. A close examination of the bill reveals that, as a feeding instrument, it is specialised in two directions. The lamellae found inside the edges of the upper mandible proclaim its ability to deal with plankton, while the formation of the terminal portions of the upper and lower mandibles demonstrate its efficiency as a cutting tool: truly an astonishing combination and one that equips the bird to deal with a range of foodstuffs. I have been unable to find in the text-books a full description of this cutting feature and shall describe it in detail. A glance at the diagram shows the considerable difference between the structure of a fulmar's bill and that of a herring gull *Larus argentatus*, which latter may be considered as a representative of the fulmar's competitors in coastal waters. The terminal portion of the lower mandible of the gull is comparatively flat, whereas in that of the fulmar it is rounded and steep, and the terminal plate of the

fulmar's upper mandible is a strong curved hook, much more hawk-like than gull-like. In my opinion, after experimenting with the bills of both species, when these two bills bite into any bulky animal matter, the bill of the fulmar will detach a piece much more readily than will that of the gull and for the following reason. The forward-facing steep edges of the terminal portion of the lower mandible of the fulmar are *extremely sharp*, as also are the edges of

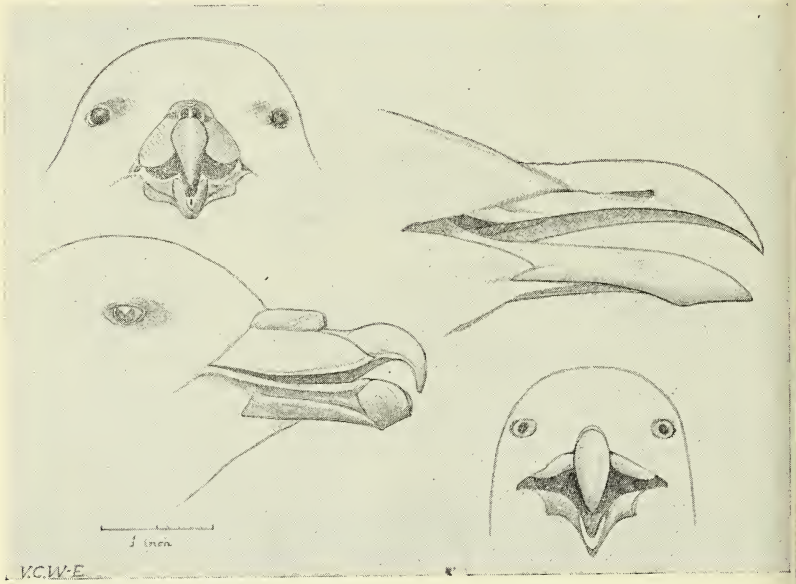

Fig. 1. Front and side views of the bills of a female fulmar (*left*) and a herring gull (*right*)

the hook which closes down on them during a bite. The bite of the fulmar, in this region, has a scissors-like shearing action, as can be imagined from the illustrations, and when the bill is closed on animal matter, two cuts are made at an acute angle to each other (by the sharp edges of each side of the end of the lower mandible), while the hook of the upper mandible is embedded at the apex of the triangle thus formed and embedded at the *most effective spot* for tearing out the piece. A backward jerk of the head is all that is needed to complete the action. Because of its simpler construction the gull's bill is handicapped in similar circumstances. And then the bird may be considered in true pelagic conditions on the great fishing banks where it will be found equally at home feeding amongst the small petrels, the kittiwakes or the large shearwaters. Here the

fulmar will doubtless be mostly a plankton feeder, but I have seen it picking up small individual items of food as daintily as any kittiwake—proof of the bill's adaptability in that direction. The bird may not be as good at diving as the shearwaters, but when occasion demands it is quite capable of diving a few feet below the surface. Thus it may be seen that the fulmar, with its versatile bill, is particularly well equipped to deal with *any* sort of animal matter found in or on the surface of the ocean and ranging from living plankton to dead whale. Those observers who have seen floating carrion surrounded by fulmars and such formidable birds as great black-backed gulls *Larus marinus* and great skuas *Stercorarius skua* can testify that the fulmars are invariably in the front line, adding their natural pugnacity to their feeding capabilities, a very formidable combination which probably places the fulmar at an advantage over any other bird in the North Atlantic. In addition to the features already described there is the epigamic aspect of this remarkable bill, as is stressed by Professor V. C. Wynne-Edwards in *Scottish Naturalist*, 64: 88. There would seem to be good reason for suspecting a relationship between the cackling display and the sexual dimorphism in the bills which is very distinct in the Atlantic races of the fulmar.—G. T. Kay, Lerwick.

Garganeys in North Argyll and South Inverness.—On 20th March 1953, on the River Shiel near Acharacle, I observed a party of garganeys *Anas querquedula*, consisting of four drakes and a duck. The low level of the river had exposed considerable areas of weed and here the birds were feeding: my eye was immediately caught by the grey flanks and white eyebrows of the males. The birds were shy and, at my approach, flew down the river, which, at this point, forms the boundary between Argyll and Inverness. The garganey has only rarely been recorded from Argyll and, so far as I know, has never been observed previously in Inverness. The previous month had been characterised by a prolonged spell of fine anticyclonic weather; but the occurrence of these birds so far north may possibly be due to the flooding of large areas in Holland with salt water which is, as is well known, abhorrent to this species.—M. F. M. Meiklejohn, Glasgow.

In 1947 J. W. C. received particulars from Christopher Dalgety concerning the finding of a teal's nest, by B. G. Lampard-Vachell, that summer, in a marsh adjoining the river Spey, in East Inverness. The nest, which was placed in a tuft of sedge-grass, contained six eggs, the same size as those of a teal and creamy-white in colour. "The down in the nest was definitely darker than that of the teal,

the tufts were smaller and whiter, more numerous, and the ends white, which is not so in that of the teal." Mr. Lampard-Vachell felt sure that the nest was that of a garganey. He continues— " Shortly after I had found the nest, I saw two drake garganey and a duck flying down the river. . . . Further a local ornithologist told me that they had been seen there, but it was not known whether they nested." Speyside is of course some distance from the locality where the birds were seen by Professor Meiklejohn, but we feel that this information should be recorded now, as it is all we have at present concerning the garganey in Inverness.—EDITORS.

Red Grouse Feeding and Drinking.—On 25th February 1953 while driving south of Muthill, Perthshire, and crossing the Moor of Orchil, I observed a cock red grouse *Lagopus scoticus* perched about 7 feet up in a hawthorn hedge. I stopped the car some 20 yards away and through 8 × 40 binoculars watched the bird feeding on hawthorn buds. The *Handbook* records berries being taken in autumn, but does not mention buds in the early part of the year. The time was about 12.30 G.M.T., a point which is of interest in view of the observations by Vesey-Fitzgerald (*British Game*, 1946, pp. 17 *et seq.*).

While watching the cock bird mentioned above, my attention was drawn to a hen red grouse drinking from a pool of rain water at the roadside some 40 yards ahead of me (*cf.* Vesey-Fitzgerald, *loc. cit.*, p. 17, and *British Birds*, 41: 60). A few moments later the hen bird was disturbed by a passing car but the cock continued to feed on the hawthorn buds.—ALEXANDER CROSS, Monifieth.

Waders landing on Water direct from Flight.—On the Eden Estuary during the period September-November 1952 I noted three instances of waders landing on the water from flight, while, in a fourth, a flock made as though to land but flew off after touching the water with their feet.

In the first incident, a single dunlin *Calidris alpina* detached itself from a small flock and landed on the water some few yards from the shore. After sitting still for a few seconds, it swam ashore. It is perhaps worth noting that several times the flock made as though to land and, on one occasion, most actually touched the water with their feet. The next two incidents both concerned redshank *Tringa totanus*. Two which were " sparring " on the mud took flight, one chasing the other, and after a spell of this, both birds landed on the water, which at this spot was some 3 to 4 feet deep. They sat still

for a few seconds, when one swam to the shore, the other swimming upstream a few yards before flying off. In the third incident, a party of twelve redshank flying low over the water suddenly checked their flight and landed in the midst of a group of teal *Anas crecca*. They stayed on the water for nearly fifteen seconds before rising and flying off. The fourth incident concerned a flock of about 300 knot *Calidris canutus* which, when over the water some 10 to 15 yards offshore, fluttered down as though to land, but rose again after "paddling" with their feet on the surface.—John Grierson, Dundee.

Greater Black-backed Gull diving for Food.—The only published record I know of the greater black-backed gull *Larus marinus* diving for food in inshore waters is in *British Birds*, 41: 93, and it is therefore of interest to record the following observation. On 26th December 1952 a single greater black-backed gull was observed off Broughty Ferry, Angus, flying up river (Tay Estuary) about 15 feet above the water. Suddenly it checked in flight and dived into the water. It went in with a splash and was completely under the water long enough for the splash to settle before the gull emerged with a small fish in its bill. The fish was given a shake and then swallowed. I watched for about 5 minutes but the gull remained on the water.—Alexander Cross, Monifieth.

A Snowy Owl in the Cairngorms during Summer.—With reference to the record of this occurrence (*Scot. Nat.*, 64: 176-177), Professor Meiklejohn points out that it would be in the interest of future bird-historians to record that the bird was seen in the counties of Aberdeen and Banff, and frequented the watershed area between the rivers Dee and Avon.—Editors.

Little Gull in Angus.—In recent years quite substantial numbers of little gulls *Larus minutus* have been seen in the Tay estuary. In addition to the records of 1922-24 already referred to (*Scot. Nat.*, 64: 122), there were reports of single birds at Elliot on 25th September 1925 (*Scot. Nat.*, 1926: 74), on 16th January 1926 (*Scot. Nat.*, 1927: 136), on 24th and 28th September 1926 and on 15th October 1926 (*Scot. Nat.*, 1926: 174). There were further records of small numbers at Elliot between 24th August and 6th September 1928 (*Scot. Nat.*, 1929: 113).

There were also two records for the east shore of Tentsmuir—an adult on 2nd May 1953, and a party of about ten in June 1932.

In the Tay estuary itself the following records have been got:—

1929. One at Invergowrie on 31st December 1929 (*Scot. Nat.*, 1930: 30).
1940. One found dead at Kingoodie on 25th February.
1941. Twenty-four (three juvenile: mostly adults in winter plumage) at Kingoodie on 6th April; twelve at least at Invergowrie and Kingoodie on 20th April.
1942. One adult in summer plumage at Invergowrie on 30th April.
1948. Three at Monifieth Bay on 29th May, six on 3rd July, two adults on 9th October, and seven adults and one juvenile on 14th October.
1949. One adult at Monifieth Bay on 15th January, eighty-three (about twenty in summer plumage) on 16th April, and five immatures on 16th July.
1950. Seventeen (eleven adults, four juveniles) at Monifieth Bay on 11th February, one hundred and four (twenty-three juveniles) on 25th March, eleven (four adults in summer plumage) on 6th May, and three at least on 18th November.
1951. Five (four adults in winter plumage) at Monifieth Bay on 10th March, three (two adults in winter plumage and one juvenile) on 2nd April, two juveniles on 19th July, and three (one adult and two second-year immatures) on 17th November.
1952. Two at Monifieth Bay on 12th January.

For the later period there is one report of fourteen from the Angus coast at Carnoustie in September 1947.—Henry Boase, Invergowrie, Angus.

These notes show clearly that the little gull is a regular and frequent visitor on the Angus coast, with occurrences reaching a peak in April.—Editors.

An unusually-coloured juvenile Rook.—Lt.-Col. W. M. Logan Home informs us that an abnormal young rook *Corvus frugilegus*, shot near Eyemouth, Berwickshire, on 9th May 1953 was brought to him, and that the skin has since been forwarded to the Royal Scottish Museum. The whole plumage, including the tarsi, was of a uniform dark brown or mouse-brown colour, without a trace of any black, or green or purple gloss.—Editors.

Willow-tit *Parus atricapillus* in Sutherland.—Where the Lairg-Lochinver road crosses the River Cassley, there is, or rather was, a lovely wood. I visited it in April 1953 ostensibly to record on

colour film the scene of devastation wrought by the awful gale of last winter. The saddening scene, albeit a mere sample of what has happened to so many lovely trees, depressed me, and I sat by the bridge fascinated in a horrified way by the chaos before me.

The day was warm and sunny and I soon realised that the wood of dead trees was pulsating with bird life, among them the great, blue and coal tits. I watched them through my binoculars and thought how little the exotic birds of the tropics outshine our own native birds in their spring plumage. My depression was lifting when suddenly there flitted into my magnified gaze, no farther away than the huge torn-up roots of the nearest tree, a wonderful little willow-tit. He explored the roots and earth in true tit-like fashion for a good five minutes, during which time I had an excellent view of him. Being a singularly ignorant ornithologist, it was not until I looked up my reference book that I discovered that this little fellow had no right to be in Sutherland. I felt quite elated at my find, and was not unaware of the fact that had this wood not been felled by a mighty hand, in all probability my little bird would have flitted about unseen.—J. Graham, Edinburgh.

Willow-tit in North-west Sutherland.—On 24th November 1949 a black-capped tit, which I identified as a willow-tit *Parus atricapillus*, appeared amongst some young conifers and *Fuchsia*, on the north-west coast of Sutherland, some 14 miles south of Cape Wrath. I watched the bird at very close range on and off during the day, and it appeared to differ slightly from those I have seen in the south of England in that the black was confined to the crown of the head, and did not continue down the back of the neck. The bird remained throughout the day amongst the cover where it was first observed, but was not seen again.—John F. Palmer, Rhiconich, Sutherland.

The above records appear to be the first occurrences for Sutherland.—Editors.

Lesser Grey Shrike in Aberdeen.—On 3rd November 1952 Mrs. Catherine Bruce of Wellington Street, Aberdeen, brought to me the body of a juvenile male lesser grey shrike *Lanius minor*, bearing a British Trust for Ornithology ring, no. P. 5177. The history of this bird is interesting: it was first trapped and ringed by Dr. E. A. R. Ennion at Seahouses, Northumberland, on 14th September 1952. On the night of 15th October it flew into a chimney of Mrs. Bruce's home, and came down into the house the following morning when a fire was lit below it: it subsequently

remained alive for 9 hours. Unfortunately the body did not reach me until nearly 2½ weeks later by which time it was in very poor condition; nevertheless it has been preserved as well as possible in the University collection at Aberdeen.

This appears to be the first record of this species on the mainland of Scotland, although several others have been recorded from Fair Isle and Shetland. I am indebted to Miss E. P. Leach for details of the bird's original capture in Northumberland.—Ivan M. Goodbody, Aberdeen.

Flock of Goldfinches in Perthshire.—On 31st March 1953 I saw a flock of thirty or forty goldfinches *Carduelis carduelis* at Crianlarich, feeding on a part of the railway bank that had been burned quite bare. I think that this is worth putting on record, because the only specimen that I have ever seen here before was a dead bird that I picked up in November 1937 on the road between Crianlarich and Tyndrum. I gave it to a friend, and he had it preserved.

None of the keepers or other residents here seem to know the bird, or to have ever seen one.—Gordon Place, Crianlarich, Perthshire.

Mr. Place informs us that their gamekeeper, John MacDougall, first saw these small birds with bright yellow in their wings, and, not knowing what they were, reported them to Mr. Place. They went back and found them still there, and observed them through field-glasses at 12 or 15 yards distance. Every detail, such as the red forehead and throat, was clearly seen.—Editors.

Chaffinch with successive Broods in same Nest.—On 17th May 1952 I found the nest of a chaffinch *Fringilla coelebs* near Morton Lochs, Fife. The nest, which was built in a whin bush, contained three recently hatched young. On 25th May the young were ringed and left the nest within the next few days.

On 4th June I had another look at the nest and found it contained three eggs, and on 11th June the female was sitting on four eggs. All four eggs hatched out and the young were successfully reared.—John Grierson, Dundee.

BOOK REVIEWS

Deer and Their Management in the Deer Parks of Great Britain and Ireland. By G. Kenneth Whitehead. London: Country Life Limited. Pp. 370, 138 half-tone plates, 2 diagrams and 1 sketch. £4 4s.

This volume is concerned, not with the red deer in the open deer forest, but with the several species that are still to be found in the more sheltered conditions inside the wire of the deer parks of Great Britain and Ireland. Not since 1890 has any permanent record been made of deer parks in England, and no previous work has included those of Scotland, Wales, and Ireland as well. Modern conditions have led to drastic changes and reductions in deer parks, which were intensified during the last war; herds were reduced, some completely extinguished, and damage to park-fencing resulted in the escape of deer of various kinds into the surrounding countryside, where a few are becoming established. This book will be of assistance to future workers in tracing the origin of such accidental introductions.

The notable herds at Warnham Court and Woburn Abbey are dealt with in detail in a chapter each. The natural history of deer in general is discussed, and an account given of the red, fallow, and roe deer, and of eleven non-British park deer. The remainder of the volume is devoted to an account of each of the deer parks of England, Scotland, Ireland, and Wales, including the beasts in zoological gardens, that were in existence in 1949; figures of their populations are given, together with previous ones where known. The author discusses the part that deer parks might play in the supply of venison, and one cannot help feeling that some useful research could be conducted on various aspects of deer population, at any rate in those parks of larger acreage, and that more could be done than has yet evidently been attempted in this country on the feeding and food preferences of deer.

Besides a general index there is an index of parks, paddocks, and zoos, and a third giving their owners. There is mention throughout the text of very many papers and books on deer, so that it is surprising to find no bibliography included, especially as a volume of this character is destined to become the standard reference work on park deer for many years to come.

Though the 138 half-tone plates cannot all be classed as absolutely satisfactory, the book is worthy of the high standard one associates with its publishers; indeed one's only serious criticism of the volume is the lavishness of its production.—J. W. C.

Check-list of the Birds of Great Britain and Ireland. Prepared by the List Sub-Committee, British Ornithologists' Union, London, 1952. Pp. xii + 106. 7s. 6d.

Liste des Oiseaux de France. By Noël Mayaud. Alauda, 21: 1-63, 1953.

The appearance within a few months of two new check-lists, covering almost exactly the same birds and facing the same problems, is a matter of

much interest to European ornithologists. After carefully studying each and comparing them together, one is likely to conclude, no doubt unjustly, that the best committee to entrust with such grave responsibility is a committee of one. M. Mayaud's list, while not entirely beyond criticism nor free of minute typographical errors, is altogether fresher, better balanced and more skilful in avoiding difficulties; it has an air of authority that commands great respect for the knowledge and judgment of its author.

Check-lists no doubt cause fearful headaches to their compilers; like home cooking, they are certain to draw our complaints if they contain anything in the least unpalatable, yet are unlikely even at their best to win any praise beyond a tacit acceptance. The British list contains rather fuller information than M. Mayaud's, which is intended merely to bring up to date the larger *Inventaire des Oiseaux de France* of 1936, wherein details of distribution and references are to be found; consequently the B.O.U. list has greater scope for error. We cannot escape the general feeling that it falls far short of expectations. In a field where fashion and modernity play a definite part, it is outpaced in its pursuit of the leaders in the game, who are clearly some distance ahead.

Able reviews of the B.O.U. list have already appeared, in particular the one written by the editors of *British Birds* (46: 114-116), whose observations must have been widely acceptable. Other valuable comments by Col. Meinertzhagen and Mr. Williamson have appeared in the *Ibis* (95: 365-369).

The best innovation in the British list is the introduction of the " Wetmore " order (though the reader is left to find this out for himself, for no explanation is provided either of the classification or its merits). M. Mayaud has gone a stage further (the Wetmore sequence having been followed already in the 1936 *Inventaire*) and adopted all but one of the amendments of Mayr and Amadon (*Am. Mus. Novit.*, No. 1496, 2nd April 1951). These include a questionable return to the time-honoured ordinal names, " Tubinares ", " Steganopodes ", " Grues " and the rest, besides a number of commendable rearrangements in the sequence, conforming with later views upon avian evolution and relationships.

The B.O.U. list places the type species of a genus (if it is included among the British forms) first, even when it must be uprooted from its natural place in the series in order to do so. No indication is given of any compensatory advantage for this principle; and it is not carried down to the next stage, namely, the sequence of subspecies under their species-headings: here the nominate race gives place to any others which occur more commonly or characteristically in the British area. Nor is it applied higher up the scale, for instance in placing the genera within the families.

We note with interest and approval that M. Mayaud has dropped the controversial *Colymbus* for the divers in favour of *Gavia*, following the recent suggestion of Salomonsen (*Proc. X. Int. Orn. Congr.:* 149, 1951). We in Britain should certainly follow this lead, and hope that American ornithologists will make the complementary move by accepting *Podiceps* instead of *Colymbus* for the grebes.

We should like to follow the French list in uniting Bewick's with the whistling swan, to be known therefore as *Cygnus columbianus bewickii;* and calling the whooper by the trinomial *Cygnus c. cygnus*, recognising that it is conspecific with the trumpeter swan of North America. Also in uniting under *Corvus corone* both *corone* and *cornix*, the carrion and hooded crows, as Newton (" with his usual perspicacity ", says Saunders) desired to do more than seventy years ago (in Yarrell, 4th ed., 2: 274 ff., 1876-82); and as most of our foreign contemporaries have now been doing for some time past. This is a subject to which we intend to return at an early date.

Upon the same topic, we would commend the inclusion of our red grouse among its intimate relatives, under the name of *Lagopus lagopus scoticus*, and likewise the American spotted sandpiper as *Tringa hypoleucos macularia*. Many must be the expatriated Britons who have discovered with delight, in the voices, manners, nests, chicks and juveniles of the willow grouse and spotted sandpiper, the authentic spell of their own native moors and watersides. (For *T. macularia* see also Rowan, *Brit. Birds*, 20: 221, 1927.)

The good intention of the B.O.U. sub-committee to mention the North American English names, where they differ from ours, has been very imperfectly carried out; it is possible to find more than twenty species whose well-known American names are entirely omitted. To promote international uniformity of English names a praiseworthy concession has been made in asking us to adopt, in the case of rare or accidental vagrants, the name used by English-speaking ornithologists in those regions abroad to which the bird normally belongs. Thus we must sacrifice our " yellow-shanks " in favour of " yellow-legs " (why the hyphen, which does not appear in the A.O.U. list?), and may more gladly part with " Carolina crake " and " American nightjar "; but we are still to retain our insular tradition, it appears, in the cases of the " American wigeon ", " red-breasted snipe ", " Bartram's sandpiper ", " American stint " (and perhaps others), though consistency and reason both recommend the substitution of " baldpate ", " dowitcher ", " upland plover " and " least sandpiper ". There should certainly have been a preface in which the reasoning and motives of the compilers were made known; much criticism of this sort might thereby have been disarmed.

Among the very few misprints we note that, if original orthography is adhered to, the black-billed cuckoo should be *C. erythropthalmus* (lacking its second *h*); the mis-spelling of *Glareola nordmanni* has been noted by others. We are uncertain whether the gender of *Xenus* (the Terek sandpiper) can be shown to be feminine, or whether the customary *cinereus* ought to have been retained in place of *cinerea*. *Lymnocryptes* is perhaps also of uncertain gender (*Auk*, 61: 447, 1944). The citation of *Podiceps caspicus* (if this is the name to be used) cannot, we think, have been correctly given, for its author's name should be in brackets.

Other details of nomenclature concern the non-recognition of subspecies in *Larus glaucoides* (see *Auk*, 62: 441, 1945, under *L. leucopterus*), and *Limnodromus griseus* (see *Auk*, 58: 376, 1941 and 65: 285, 1948).

M. Mayaud's list departs rather freely from original orthography, and not merely in respect of proposals recommended for consideration by the International Commission. Original spelling may be retained, as in *pytyopsittacus* and *Oceanodroma leucorhoa*, or amended, as in *ochropus*, *Oenanthe oe. leucorrhoa*, *Limnocryptes* and several others. Brackets are occasionally missing where required round authors' names, and on one line the hoopoe appears as *Urupa*.

In the British list the brief citations of range and status, particularly within the British Isles, are uneven and sometimes seriously misleading. Thus for the chiffchaff, lesser whitethroat and several other warblers, " breeding visitor, common " (for the British Isles as a whole) is far from being true north of the border. We note " local, Scotland " for the bullfinch, which is recorded as resident in almost all the mainland counties, and " rare, Scotland " alike for the cirl bunting and the jay, which we ourselves should be unlikely to bracket together in these identical terms. The little owl, like the barn owl, is " resident, common ". Among the foreign ranges there are many similar mis-statements, e.g. " Arctic America " for Bonaparte's gull, which, being chiefly famous for nesting in trees, must necessarily dwell outside the treeless Arctic.

The admission of introduced species should be subject to periodical review, in case there are any new candidates to add to the Canada goose, capercaillie, pheasant, red-legged partridge and little owl. No doubt a deep sentiment is sufficient grounds for retaining the name of the great auk perpetually on our list.

There is nothing in our criticisms of the B.O.U. list, nor in those of others we have seen, which raises an insuperable difficulty—nothing which cannot rather easily be improved in a revised edition. It is very much to be hoped that the Union will find it possible to undertake a revision immediately. Whatever our verdict upon the present result, the sub-committee have in fact done the heavy spade work, and we should be duly thankful for so much disinterested endeavour. A wave of the magic wand is now required to give the satisfying turn to our list that M. Mayaud has achieved for our French colleagues.—V. C. W-E.

NOTICE TO CONTRIBUTORS

THE SCOTTISH NATURALIST is devoted to the study of Scottish Natural History, and is therefore concerned with all the many aspects, zoological, botanical, geographical, topographical and climatic embraced by this title.

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The Scottish Naturalist

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THE DEVELOPMENT OF AN ORNITHOLOGIST

LEONORA JEFFREY RINTOUL

1878–1953

James Ritchie

The natural history of Scotland in many of its branches owes a vast debt to the labours of amateur naturalists, and for the recording of the country's birds the highest recognition must be given to the work of Miss Leonora Jeffrey Rintoul and her constant partner in the study of birds, Miss Evelyn V. Baxter. This is even greater merit than it seems at first sight, for in building up this repute they broke a long tradition of silence, since their records were the first persistent observations contributed by Scottish women to the knowledge of Scottish natural history.

There was nothing in Miss Rintoul's early life to suggest her later devotion to ornithology, unless it was that natural inquisitiveness which is the heritage of a country-born child. She was born in 1878 not far from the Firth of Forth at Lahill near Largo in the kingdom of Fife, the elder daughter of Major Robert Rintoul. Her early education, undertaken at home, and her youthful journeys on the Continent, while broadening her background of knowledge and experience, can scarcely have given her any special stimulus towards intensive nature study. Indeed, the development was obviously gradual, for it was not until 1905 that her first simple record, linked with the name of Miss Baxter, appeared—" Pied Flycatcher and Ivory Gull in Fife "—and it was undoubtedly the association with Miss Baxter which gave objectivity to what had been no more than

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a pleasant hobby, and which produced so profitable a partnership.

A few years of casual recording helped to give assurance to field-work and led to the next great development. In 1905 Dr. Eagle Clarke, accompanied by a young enthusiast, Norman B. Kinnear, paid his first visit to Fair Isle for the study of bird-migration. The choice of site was an auspicious one and the notable results led to a revival of interest in Scottish migration. Miss Baxter and Miss Rintoul, then frequent visitors to Eagle Clarke and the bird collections in the Royal Scottish Museum, shared in the interest and decided in 1907 to make use of the Isle of May as a second island station for the observation of seasonal bird movements. The possibilities of solving some of the problems of migration by a comparison of migratory movements on these islands, far apart and yet lying roughly parallel to the continental coast, can well be imagined. For twenty five years (1907-33) the two ladies visited the May during the spring and autumn migrations, and the mass of observations made by them and their successors on the Isle have yielded much information and will yield still more to further penetrating analysis. Here I must say how much I admired the knowledge and patience and unfailing good-will with which Eagle Clarke helped and encouraged the learners, young and old, who came to the Royal Scottish Museum for his assistance and advice.

While the Isle of May observations were being carried on other noteworthy developments were taking place. For many years *The Annals of Scottish Natural History* had published an annual "Report on Scottish Ornithology" based upon scheduled returns by observers, co-ordinated by a well-known Glasgow naturalist, Mr. John Paterson. In 1910 the "Report" was taken over by Miss Baxter and Miss Rintoul, and at once a change in its content was observable. Hitherto it had been a competent record of the occurrence of species ; now to the accustomed list were added notes including comments on the weather conditions at times of major bird movements. At first the meteorological notes were general and tentative, cycloneish and anticycloneish, but as the Reports proceeded, and they continued for twenty years, the linkage between specific weather conditions and migrations became

more clearly seen, and the revealing suggestion was advanced that immigrants to Scotland, instead of following a predestined " migration route ", were sometimes blown here, willy-nilly, by the wind.

A second development of this period followed naturally, but not inevitably, from the first. The understanding of bird movements depended upon a thorough knowledge of the normal distributions of the birds themselves, and this led Miss Baxter and Miss Rintoul to study Scottish aspects of distribution. The results have been of great value for they have set a datum line from which invasions, or extensions or regressions of range may be judged in after years. A preliminary canter produced in 1922 " Some Scottish Breeding Duck, their arrival and dispersal ", in which the placings of nine critical species were examined : but the ultimate results were gathered together in *The Geographical Distribution and Status of Birds in Scotland* (1928), an indispensible summary of information and book of reference.

With this record behind them the two friends had now added to their own great experience a vast accumulation of information about Scottish birds. It remained to make use of and to expand this knowledge in more detailed or comprehensive surveys. The first opportunity arose when a projected " Vertebrate Fauna of Forth ", which was to continue Harvie-Brown's series of Scottish regional faunas, faded into the background with the death in 1922 of its nominated author, William Evans. Miss Rintoul and Miss Baxter undertook the work, and in 1935 *A Vertebrate Fauna of Forth* was published. Naturally the greater share of this comprehensive book is concerned with the birds, but it is safe to say that none of the nine earlier Vertebrate Faunas had the benefit of the unrivalled local knowledge of birds shared by the writers of " Forth ".

What more was left to be done ? Oddly enough, Scotland, despite all the interest of its bird life, its many published records, its long succession of observers, has never had a book recounting and discussing its bird life as a whole. I doubt if anyone has ever been so thoroughly equipped for tackling such a work as the two partners, and to accomplish it became their final ambition. So in 1953 appeared *The Birds of Scotland; their History, Distribution, and Migration*, a work in two volumes, which will remain a land-mark in Scottish ornithology and a

base line from which future changes in bird life in this country can be measured.

I have tried to trace briefly the development of an ornithologist from her first simple record to the crowning achievement of her career. It seems the content of a full life, but it would be a mistake to think that it exhausted Miss Rintoul's good works. She took a lively interest and part in local affairs, notably in connection with Women's Rural Institutes and during the wars with Women's Voluntary Services and similar organisations. She shared in the founding of the Scottish Ornithologists' Club, of which she was joint President, and was honoured at home and abroad, a Fellow of the Royal Society of Edinburgh, an Honorary Member of the British Ornithologists' Union, and a Corresponding Fellow of the American Ornithologists' Union.

My continuing impression of Miss Rintoul through the years since I first met her in the early part of the century has been of a gracious and genial personality, overflowing with good humour, alert in discussion, tempering argument with acute pleasantries, and ever sympathetic and helpful. She died on 22nd May 1953 after a prolonged period of ill-health, and alas shortly before the public appearance of *The Birds of Scotland.*

RARE AND EXOTIC FISHES RECORDED IN SCOTLAND DURING 1952 *

B. B. Rae and E. Wilson

Scottish Home Department, Marine Laboratory, Aberdeen

As in former years most of the rare fish reports received at the Marine Laboratory were the result of co-operation between fishermen and the Department's district fishery officers. In a few cases private individuals sent in specimens for identification and one record was received from Dr. A. C. Stephen of the Royal Scottish Museum. The authors wish to thank all those who contributed to the list.

Hexanchus griseus (Gmelin)—Six-gilled Shark

Records of this shark are extremely rare in the Scottish lists. An exceptional landing, however, was made at Aberdeen towards the end of July by a great-line vessel fishing 60 miles north-west of Sule Skerry. This catch included a number of six-gilled sharks of which thirteen were brought to port. Two of the fish measured 195 and 228 cm.

Later in the year, at the end of November, a single specimen, a male of 231 cm., was trawled 8 miles south-east of Fair Isle.

Lamna cornubica (Gmelin)—Porbeagle

Three specimens of the porbeagle were recorded during the year as follows:

Date	*Position*	*Method of Capture*	*Length (cm.)*	*Sex*
May 5	198′ N.E. × E.½E. Aberdeen	Drift-net	236	M
Sept. 23	100′ N.E. × E. Aberdeen	Trawl	152	—
Nov. 25	Off Skerryvore	Seine	208	—

The first two were caught in association with herring shoals, a feature which has frequently been noted in regard to this species.

* *Received* 7th *May* 1953

Trygon pastinaca (L.)—Sting Ray

Two sting rays were trawled on the 15th and 22nd November, the former 54 miles E. and the latter 30 miles S. × E. of Aberdeen. The first fish was not procured for examination but the second, a male, was found to measure 28 cm. across the disc and 47·3 cm. in total length.

Myliobatis aquila (L.)—Eagle Ray

It is an interesting coincidence that two eagle rays, both females, were also trawled in November in the northern North Sea. One, captured on the 8th, 12 miles S.E. of Aberdeen, was 49·5 cm. in breadth and 78·8 cm. in total length. The corresponding measurements of the second fish which was captured on the 14th, 44 miles S.½E. of Aberdeen, were 53·8 cm. and 87·8 cm.

An isopod found in the axil of the dorsal fin of the latter was identified as *Cirolana borealis*.

Chimaera monstrosa L.—Chimaera or Rabbit Fish

Subsequent to the publication of the 1951 list (*Scottish Naturalist*, 1952, 64: 102-111) information was received of the capture of a chimaera in November of that year N.N.W. of Sule Skerry at a depth of 256 metres.

Two records of single fish were obtained in 1952. The first, early in April, by trawl from 75 miles N.E. × E. of the Outer Skerries, Shetland, at a depth of 164 metres, was a female of 78 cm. containing two undeveloped eggs of about 4 cm. diameter. The stomach contents of this fish included decapod crustacean, molluscan and ophiuroid remains. The second fish, landed towards the end of July, was caught by great line 60 miles N.W. of Sule Skerry.

Acipenser sturio L.—Sturgeon

Date	*Position*	*Method of Capture*	*Length (cm.)*	*Weight (kg.)*
Jan. 18	3½′ E.½N. Troup Head	Seine	—	16·0
Feb. 2	Loch Clash (N.W. Scotland)	Seine	152	14·1
May 15	160/180′ N.E.½N. Buchanness	Trawl	152	16·8

Alosa alosa (L.)—Allis Shad

Date	*Position*	*Length (cm.)*	*Sex*	
Mar. 26	Off Ardrishaig, Loch Fyne	32·0	F	maturing
July 8	Loch Eynort, S. Uist	42·5	M	spent
Aug. 4	River Tweed	56·0	F	ripe
Nov. 11	Loch Striven	39·2	F	spent and recovering
Nov. 17	S. end of Inchmarnock	32·3	M	spent and recovering

The reproductive organs showed various stages of development indicating spawning in Scottish waters. The condition of the gonad of the fish caught in the Tweed, 7 miles from the sea, confirms previous records as to the presence of this species and its spawning in this river.

Three of the fish, nos. 1, 2 and 4, had a row of dark spots along their sides—a character which was not present on nos. 3 and 5. Two fish, nos. 3 and 5, were not feeding, no. 2 was found to be feeding on *Temora longicornis*, no. 4 on *Thysanoessa raschii*, while the stomach contents of no. 1 were unrecognisable.

Alosa finta (Cuvier)—Twaite Shad

A single record of this species was obtained from a seine-net catch from the Burra Haaf, Shetland, on 19th February. This fish, a maturing female of 41 cm. length, and 612 gm. weight, was not feeding at capture. There were no dark spots along the sides.

Sardina pilchardus (Walbaum)—Pilchard

Three records involving the capture of five fish were received from catches by herring drifters fishing in the Minch, off the coast of Lewis, from 23rd January to 28th February. Enquiries made among the fishermen in the area have confirmed that the pilchard is not a common species in the Minch.

Towards the end of October, small numbers of pilchards were also observed in herring catches from grounds off South Uist.

Belone belone (L.)—Garfish or Greenbone

Between 4th and 13th April eight specimens were caught by herring drifters at positions extending from 178 miles E.N.E. to

180 miles E. × N. of Aberdeen. Six of these fish were examined. In length they ranged from 68·0 to 69·5 cm. and both sexes were about to spawn. None of the stomachs contained recognisable food.

On 16th July a single specimen was caught by drift-net 33 miles S. × W.½W. of Bressay Light, Shetland. This fish, a female of 69·5 cm., had spawned and did not appear to be feeding.

Yet another record was obtained in a manner similar to that in which one of the 1951 records was procured, namely, by the fish being washed on board a vessel, on this occasion a cargo vessel bound from Norway to Scotland. This occurred about 50 miles west of the Naze, during the night of 31st August. The fish, 72·7 cm. long, was identified as a female which had spawned and was already showing signs of recovery. The stomach contained small vertebrae.

Macrurus fabricii Sundevall—Grenadier Fish

Specimens of the Macruridae are not infrequently caught by vessels fishing with great-lines in deep water between Greenland and Iceland. One specimen caught off Cape Dan, E. Greenland, at the end of June was identified as *M. fabricii* from the descriptions by Smitt (1895) and Goode and Bean (1895). The fish was a female of 82·5 cm.

In August three fish were caught by great-line S.W.½S. from the Munken Rock, Faroe. One of these was procured and identified as *M. fabricii*. This fish, also a female, was 82 cm. long. The stomach was empty except for some ophiuroid remains. Traces of food in the intestine were recognisable and included the remains of a deep-water boreal mysid, *Thysanopoda arctifrons*, two specimens of *Tmetonyx acutus* and the operculum of a gastropod. Four worm parasites were found in the intestine.

Both fish have been preserved. This species is not known from British waters and therefore does not appear in the British Museum (Natural History) list (Norman, 1935).

Coryphaenoides rupestris Gunner—Grenadier Fish

One specimen of this member of the Macruridae was caught by great-line, on herring bait, W.S.W. of the Westmann Isles,

Iceland, in March. The fish, 85 cm. in length, was a female which appeared to have spawned. The stomach in this case was empty. The specimen has been preserved. The identification was based on the descriptions by Smitt and by Holt and Calderwood (1895) under the name of *Macrurus rupestris*.

Molva byrkelange Walbaum—Blue Ling

The species, common in Icelandic and other northern waters, is a rare visitor to the North Sea. One specimen was taken by seine-net 40 miles E. × N. from Bard Head, Shetland, on 29th February. It was a maturing male and measured 56 cm. A second was captured in April, by a seine-net vessel which had fished in various places from 60 to 90 miles N.E.½E. to N.E. × N. from Kinnaird Head. Another record was obtained from a great-line catch from the south-west corner of Faroe Bank but the species is probably not so rare in this region.

Mora mediterranea Risso

A single specimen of this fish was caught by great-line in deep water west of Iceland at the end of April. Identification was based on Holt and Calderwood's description (1895). The fish was a female of 76·5 cm. length and 4·8 kg. weight. The specimen has been preserved.

Raniceps raninus (L.)—Lesser Fork-Beard

One record of this species was obtained in March from a seine-net catch off Cove Bay, a little to the south of Aberdeen. The fish, a male of 28 cm., was not feeding.

Lampris guttatus (Brünnich)—Opah or Moonfish

A specimen was washed ashore in Burra Firth, Unst, Shetland, on 31st August. Identification in this case was confirmed by means of an excellent photograph taken by a schoolboy.

Trachypterus arcticus (Brünnich)—Dealfish

Another interesting Shetland record was a dealfish which was found in shallow water at Whaleayre, Haroldswick, in November. The specimen, a male with a maximum body depth, exclusive of fins, of 33 cm. and a total length of 190 cm., was subsequently presented to the Department of Zoology, Aberdeen University.

Regalecus glesne (Ascanius)—Ribbon-fish or Oar-fish

This fish was stranded near Anstruther, Firth of Forth, on 8th June. When found by a Coast Guard it had suffered mutilation but the part remaining measured 11½ feet. Identification was effected by Dr. A .C. Stephen of the Royal Scottish Museum.

Capros aper (L.)—Boarfish

A specimen of this southern form, which has recently been suggested as a possible indicator species for certain hydrographic conditions (Cooper 1952), was trawled by the research vessel *Explorer*, from 154 metres at 55° 48′ N. 9° 05′ W. on 12th June. Its length was 9·5 cm.

Brama raii (Bloch)—Ray's Bream

The records on the next page of Ray's bream were collected during the year. Accurate data concerning time and place of capture of a visiting species are of importance if the migration route is to be deduced and progressive dispersal demonstrated within the North Sea. Clearly it is not always possible to obtain exact particulars (e.g. stranded specimens) but the authors are satisfied that no date given below is in error by more than plus or minus two days. An asterisk indicates two specimens captured; in all other cases the records are of single fish.

Of the thirty-four records (comprising 39 fish) two (4 fish) were by great-line, nineteen (22 fish) by trawl, three by seine, one by drift-net, eight from strandings. In one instance the method of capture was not ascertained. The scarcity of great-line records when compared with those of 1951, in which some interesting line catches of this species were made west of Ireland and Scotland, is probably due rather to the absence of Aberdeen liners from the western grounds during the latter half of the year than to any marked change in the behaviour or distribution of the shoals.

Thirty-one of the records given above were from home waters and of these only two were from grounds outwith the North Sea. Thus twenty-nine records (32 fish) were derived from the North Sea within the Shetland-Orkney boundary line. This is the largest number so far listed by the Marine Laboratory from the North Sea in any year and even allowing for the possible effect of improved reporting as compared with previous

Date	Position	Method of Capture	Length (cm.)	Sex
Aug. 15	S.W. of Sydero, Faroe	Trawl	—	—
	*Bill Bailey's Bank	Great-line	56·5	M
	*Faroe Bank	Great-line	60·4	M
Oct. 13	20′ E. Flugga	Trawl	—	—
16	120′ N.E. × N. Buchanness	Trawl	54·0	F
	*100′ N.E. Buchanness	Trawl	58·5	F
			61·0	M
17	96/110′ N.E.½N. to E.N.E. Aberdeen	Trawl	58·7	F
21	15/20′ S.E. Fair Isle	Trawl	52·8	F
28	7′ E. Outer Skerries	Trawl	57·5	F
29	10′ E.S.E. Aberdeen	Trawl	56·0	—
31	12/15′ N.N.E. Flugga	Trawl	—	—
Nov. 5	*14′ E.S.E. Sumburgh Head	Trawl	—	—
	*110′ N.E. × N. Buchanness	Trawl	—	—
6	Dunby Rock, Cruden Bay	Seine	—	—
7	Off Montrose	Seine	59·0	—
8	N. of Peterhead	Stranded	54·6	—
	Whitehills, Banffshire	Stranded	55·0	—
9	Harbour of Refuge, Peterhead	Stranded	57·2	—
11	45′ S. × E. Aberdeen	Trawl	54·0	M
13	52′ S. × E. Aberdeen	Trawl	55·7	M
14	14′ S.E. × E. Bell Rock	Trawl	57·5	F
	Old North Harbour, Peterhead	Stranded	56·5	M
18	Granton Harbour	Stranded	—	—
	3′ N.E. Tolsta Head, Lewis	Drift-net	55·0	M
20	10′ N.N.W. Flugga	Trawl	55·5	F
21	Stronsay, Orkney	Stranded	54·6	—
	Fortrose	?	55·5	M
25	Burghead Harbour	Stranded	53·3	F
26	Burghead Bay	Trawl	56·4	M
29	30/37′ E.S.E. Aberdeen	Trawl	—	—
Dec. 1	3′ S. Golspie	Stranded	—	—
3	Off Montrose	Seine	—	—
6	12′ S.E. Aberdeen	Trawl	—	—
9	15′ N.E. Longstone Light	Trawl	58·0	F

years, the 1952 incursion by Ray's bream must rank as one of the heaviest on record. It is known, too, that the species was also present in the southern North Sea. The *Fishing News* of 13th December 1952 reported—"Four Ray's bream, only rarely found in British waters, have washed ashore at Whitley Bay recently. More of these fish have been found along the Suffolk coast, where they were last recorded in 1850."

Another feature of this year's invasion has been its concentration in a short period of time. With the exception of one in mid-February 1953, not listed in this paper, all captures in home waters were made between 11th October and 9th December.

Biological observations were recorded on all the fish procured for examination. Of the 18 whose sex was determined, 9 were males and 9 females. Two of the fish taken in August were in a spent condition but 13 of the others caught in the last quarter appeared to be recovering from the effects of spawning.

Twenty-four fish were measured and ranged from 52·8 to 61·0 cm. with an average length of 56·4 cm.

It has been suggested that the Ray's bream does not feed in the North Sea (Stephen 1928A). Examination of the stomachs of fish brought to the Marine Laboratory in recent years, however, shows that this is not always so. The stomachs of nineteen of the present year's captures were examined and of these ten were empty. Two of the remaining nine contained unrecognisable material but of the others four were feeding on small fish and three on cephalopods. One of the fish-eaters contained six sand eels and otoliths of a flatfish, another contained two small fish, one of which was identified as a whiting, the third contained a gadoid fish and the fourth otoliths. Two of the three feeding on cephalopods contained small specimens resembling *Sepiola*.

Various parasites were found in the fish procured for dissection, and for the identification of these we are indebted to Mr. S. Prudhoe of the staff of the British Museum (Natural History). They include encysted larval Phyllobothriid tapeworms on the gill-rakers, encysted larvae of a Didymozoid trematode, *Kollikeria filicollis*, from the gills and plerocercoid larvae of the tapeworm *Gymnorhynchus gigas* from the muscles. The last-named parasite is a rather unusual form, which pervades the muscle tissue with a much elongated tail portion, from a well-defined bladder-like head region. Occasionally one side of the fish only is affected but more frequently both sides are parasitised by one or more worms up to a maximum of four. This parasite appears to be common in the Ray's bream reaching Scottish waters; it was identified in seventeen out of the eighteen fish dissected for that purpose.

Mullus surmuletus L.—Red mullet

Fourteen records including eighteen fish were obtained during the year.

With the exception of the first three all were obtained from coastal waters extending from Troup Head to the Isle of May, and of these east coast records all but one were obtained in the last quarter of the year. These records, which resemble earlier records as regards time and place of capture (Thompson 1918), suggest a movement of red mullet from the southern North Sea into Scottish coastal waters which may have begun as early as August (see record no. 4), but which certainly reached a peak in the last quarter.

Date	*Position*	*Method of Capture*	*Length (cm.)*	*Sex*
Jan. 8	Loch Fyne	Seine	22·5	—
Feb. 26	22′ E. × S. Bard Head	Seine	26·4	F
Aug. 6	Between Bressay and Sandwick	Seine	—	—
13	5′ E.N.E. Scurdy Ness	Seine	25·4	F
Oct. 10	*6/8′ S.E. × S. Scurdy Ness	Trawl	—	—
29	10′ E.N.E. May Isle	Trawl	34·5	F
Nov. 12	South of Tod Head	Trawl	29·5	F
14	6′ S.E. Scurdy Ness	Trawl	34·0	F
15	Off Troup Head	Seine	—	—
22	30′ S. × E. Aberdeen	Trawl	31·8	F
Dec. 3	†6′ E. Scurdy Ness	Trawl	—	—
6	30′ S. × E. Aberdeen	Trawl	—	—
13	30′ S.S.E. Aberdeen	Trawl	—	—
27	*7/9′ N.N.E. Kinnaird Head	Trawl	—	—

* denotes 2 fish; † denotes 3 fish.

Spondyliosoma cantharus (Gmelin)—Black Bream or Old Wife

A single specimen of this very rare species for Scottish waters was caught by trawl 25 miles S.$\frac{1}{2}$W. from Aberdeen on 11th December. The fish was 29·6 cm. long.

Labrus mixtus L.—Cuckoo Wrasse

A small female of 14 cm. was taken by a research vessel off Copinsay, Orkney, on 17th July. Two specimens, both males, were trawled 40 miles N. × W.$\frac{1}{2}$W. from Rattray Head on 8th August, thus roughly coinciding both as regards place and time with similar records a year ago.

Three young fish of 13, 15, and 18 cm. were caught in a beach seine in Loch Seaforth, Lewis, on 21st November.

Trachinus draco L.—Greater Weever

Although the lesser weever *T. vipera* is a common inhabitant of certain east coast bays, the greater weever is a rare fish in Scottish waters. It is interesting, therefore, to record the capture by seine-net of a specimen 31·3 cm. in length at a position 45 miles S.E. × S. of Bressay Light, Shetland, on 7th August.

Aphanopus carbo Lowe—Black Scabbard-fish

Two specimens of this southern deep-water species were caught by great-line 50 miles N.W. of the Butt of Lewis in mid-July. Only the head of one fish was retrieved but the other measured 98 cm.

Thunnus thynnus (L.)—Tunny

Between 14th and 25th August four tunny were landed at Aberdeen by trawlers operating on the Fladen and adjacent grounds, 82 to 120 miles E.N.E. from Aberdeen. The fish were from 7 to 9 feet in length (213 to 274 cm.).

Although the tunny is a comparatively rare visitor to Scottish coastal waters, considerable numbers regularly invade the North Sea every summer and autumn, where they prey upon the herring shoals in the central region from the Fladen Ground to the Dogger Bank. The odd specimens landed by Scottish vessels give no indication of the magnitude of the tunny invasion, which, judging from reports of the activities of foreign tunny fishermen, must have been of considerable proportions in 1952.

Anarhichas latifrons Steenstrup and Hallgrimsson—Jelly-cat

This deep-water northern fish is frequently caught by great-liners in Icelandic and Greenland waters and by trawlers in the Barents and Norwegian Seas. According to Saemundsson (1949) it is not found at the Faroes although specimens have occasionally been caught in the northern North Sea (Williamson, 1910 and Stephen, 1928B). It is therefore interesting to record the capture of two specimens by great-line, the first on the Viking Bank in June, the second S.W.½S. from the Munken Rock, Faeroe, in August. No particulars were received of the

former fish but the latter, taken at a depth of over 550 metres, was identified as an immature female of 76 cm. length.

Fierasfer dentatus Cuvier—Pearl-fish

On the 30th August the research vessel *Explorer* trawled two specimens of this fish at a position 60° 04′ N. 1° 30′ E. in 115 metres. These measured 25 and 27 cm.

Mugil chelo Cuvier—Thick-lipped Grey Mullet

On 8th July a specimen, 32 cm. long, was taken in a salmon bag-net on the north shore of Loch Broom.

Mola mola (L.)—Sunfish

Five records were obtained during the year as follows:

	June	—	Southern Minch, between Mallaig and Barra.
	July	8	Burra Haaf, Shetland.
	July	10	Rockall Bank.
c.	July	23	60′ N.W. Sule Skerry.
	July	25	Dunnet Bay (research vessel).

All five fish were observed at the surface but only one (no. 4) was secured. This fish was gaffed by the crew of a drifter liner. Details noted included the length 187 cm., from tip to tip of the fins 222 cm., weight 6 cwt. or approximately 305 kg.

Two crustacean parasites from the gills were identified by Dr. J. H. Fraser of this laboratory as a male and a female of *Cecrops latreillei*.

These five fish constitute one of the highest totals for the sunfish in any single year in the Scottish records and may be regarded as indicating a relatively high concentration in home waters. Although no Scottish record was obtained from the North Sea a newspaper reported the occurrence of a large specimen near Yarmouth towards the end of the year.

The remarkable features of the Scottish rare fish records in 1952 are:

1. The heavy invasion of the North Sea by Ray's bream with its main concentration round the Scottish east coast in a period of two months ending 9th December.

2. The presence in the last quarter of the year of southern forms such as red mullet, sting ray and eagle ray in greater

numbers than usual on Scottish east coast grounds. The positions of capture of these fish were mostly to the south of Aberdeen, thus suggesting a movement northwards from the southern North Sea.

3. The presence in the northern North Sea of a few northern deep-water forms such as the jelly-cat (*Anarhichas latifrons*), blue ling, dealfish and ribbon-fish.

4. A penetration of sunfish in June and July into waters off the western shores from the South Minch to Shetland.

5. The number of sharks recorded including the exceptional haul of six-gilled sharks.

The 1952 list contains thirty different species of fish as against twenty-eight (including Chimaera recorded in this paper) in 1951. Only fifteen species are common to both lists thus revealing a marked change in the individual species listed. In only one major respect do the two years bear any resemblance. This is in the prominence in both years of Ray's bream but even in this common feature they differ quite markedly as regards the distribution of the records both in time and place, although in one respect this may be due to the incidence of the fishery. It is clear too that the degree of penetration of the North Sea was far stronger, at least in the area fished by Scottish vessels, in 1952 than in 1951. In other respects the two years show some remarkable differences. In 1951 the outstanding features in addition to Ray's bream were the numbers of sturgeon, electric rays and extremely rare summer visitors from southern waters. Territorially the emphasis of the 1951 records was on the south-western coast. In 1952 none of these features was repeated; instead the list shows the predominant species to have been certain sharks and sunfishes, mainly in the north-western region; red mullet, sting ray and eagle ray which probably reached the Scottish area from the southern North Sea; a few deep-water northern forms which penetrated the northern North Sea.

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FRACTURED EARBONES OF BLUE WHALES *

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In a paper entitled " Récherches sur l'appareil auditif chez les mammifères " Beauregard (1894) gives an explanation for the accessory sacs of the middle ear in Cetacea. His hypothesis is to the effect that the voluminous air sinuses rich in blood vessels seem well adapted to provide for the numerous changes in pressure which result from an aquatic environment. He says that under very great pressures which are produced when the animal dives, these sacs, for the most part membranous, are only a virtual cavity. The walls collapse and the air which they contain is forced into the tympanic bulla where the very thick osseous walls are not affected. This air thus accumulated makes equilibrium with the outside pressure.

Turner (1912) and Van Deinse (1938) respectively, figure and describe the tympanic bullae of two blue whales (*Balaenoptera musculus*). Both of these specimens indicate that ventrally they had sustained extensive comminuted fractures which had been partly repaired during the life-time of the animals to which they had belonged. Turner's specimen is shown in figures 1 and 2, and in general Van Deinse's is similar in nature although not so extensively damaged.

Turner did not give an explanation of the cause of the damage done to the specimen briefly described by him in his catalogue of the marine mammals in the Anatomical Museum of the University of Edinburgh. Van Deinse's explanation is that the damage was due to a heavy blow with a sharp object, for instance a rocky projection or an ice-floe. He discounts the possibility of its having been caused by a ship's propeller.

Both specimens were from blue whales and at all events Turner's indicates from the quality of the bone that it belonged to an adult animal. It does not seem probable to us that the fracture in either instance could have been caused by the

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FIG. 1.

FIG. 2.

[*To face page* 154.

impact on the bulla of an object entering the animal's body from outside. The tympanic bulla is situated remotely from the external surface of the body and protected either by massive bone or very thick soft tissue. Thus above it is the whole depth of the cranium; laterally from it the whole width of the squamosal extends for about three feet; medially it is protected by the pterygoid and ventrally by the musculature of the tongue and the hyoid apparatus, besides by the thick fatty ventral groove region of the throat. Lillie (1915) points out that the tympanic cavity is separated from the pharynx by nearly a foot of tissue. The ramus of the lower jaw would also afford an effective barrier. In order to make impact on the bulla any solid object would have to traverse a region of the throat richly supplied with major blood vessels and the likelihood of this happening without lethal effect seems very remote.

It may be argued that the damage could be produced by a pressure wave transmitted from the surface of the animals' body to the bone, but the fact that the tympanic bullae from animals killed by explosive harpoons are not known to become damaged indicates the improbability of this sort of cause being effective.

In normal circumstances the thick osseous walls of the bulla and the functioning of the blood vessels associated with the pneumatic sinuses are sufficient to withstand changes in pressure, but if the functioning of the blood vessels is impeded, pressure differences would arise between the outside and the inside of the bulla which if sufficiently great could cause fracture of the bone.

Foreign bodies such as otoliths and frequently an abundance of nematode worms are found in the air sacs of cetaceans. Either of these cases could, potentially, produce a disruptive effect on the normal functioning of the pressure regulating mechanism. Whether in fact they do so is obviously problematical but an explanation of the fractured ear bones which can be related to Beauregard's hypothesis seems more tenable than one involving the impact on the bulla of some solid object.

We should like to express our thanks to Professor Brash, Department of Anatomy, University of Edinburgh, for the loan of the specimen from the Anatomical Museum.

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Postscript to the Frigate-bird record (see p. 193)

Since we went to press M. Noël Mayaud has provided us with a number of interesting facts about frigate-birds recorded in France. Among the Louis Bureau manuscripts, which passed after that great ornithologist's death into his hands, are notes stating that the La Rochelle specimen was a male (elsewhere the sex is said not to have been ascertained), with the culmen 105 mm. (and thus very likely to have been *rothschildi*); further, that it was killed on 30th December 1900. The previously accepted date, given (years afterwards) by the man who actually shot the bird, is March 1902. Both parties are agreed that it was a tempestuous day. The skin, mounted with wings outstretched, was given to La Rochelle Museum in 1906, but it was already in a bad state, and little more than the head could be saved to be preserved until the present time.

A previous example, also assigned to *rothschildi*, was taken near the inland town of Saumur in October 1852. It is still extant. From its all-black plumage it may be presumed to be a male, with the wings 615 and 620 mm., longest rectrix 415 mm., and bill 107 mm. These measurements, as M. Mayaud points out to us, leave no grounds for doubting its identification with *F. m. rothschildi*, since it is too small for *F. m. magnificens* and too large for any form of *F. minor*, *F. ariel* or *F. aquila* (cf. the statements in *Brit. Birds.*, 47: 59, January 1954). From it was collected a specimen of the same hippoboscid fly as the one recorded here on page 194 on the Tiree bird; at the time it was given a new name, now a synonym of *spinifera*.

Some of this information may be found in Mayaud, 1936, *Inventaire des Oiseaux de France*, pages 12, 169-172.

In 1937 G. Durand, the well-known ornithologist of Vendée, reported that at about the same time as the La Rochelle record, namely 1900-02, a decomposed frigate-bird was washed up at Les Sables d'Olonne, Vendée; but, to his lasting regret, he omitted to preserve even so much as the skull! (See Mayaud, *Alauda*, 1938: 336.) There must remain some doubt as to the exact identity of this bird.—EDITORS.

NOTES ON THE BIRDS OF THE FLANNAN ISLES *

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In 1951 we spent four days, from 20th to 23rd July, on Eilean Mor, the largest of the group of small cliff-bound islands known as the Flannans, lying 20 miles west of Gallan Head on the west coast of Lewis and 40 miles north-east of St. Kilda. The Flannans fall into three clearly defined groups. The eastern group comprises the two largest islands— Eilean Mor (on which a lighthouse was constructed in 1899) and Eilean Tigh—and two fair-sized stacks—Lamha Sgeir Mor and Lamha Sgeir Beag. A mile to the south of Eilean Mor lies the southern group, consisting of Soray, Sgeir Toman and Sgeir Righinr. Roareim, Eilean a Gobha and Bronna Cleit form the western group and lie 2 miles to the west of Eilean Mor. Full descriptions of these islands are readily accessible elsewhere.[4, 7, 13, 14] Apart from the lighthouse on Eilean Mor, there is no evidence that any of the Flannans have ever been inhabited.

Published records of visits by ornithologists are few. On 11th June 1881, Dr. J. A. Harvie-Brown's party landed for a few minutes on Eilean Tigh.[11, 13] Twenty years later Dr. W. Eagle Clarke was receiving migration schedules from the light-keepers on Eilean Mor and in 1904 he and T. G. Laidlaw spent 16 days on the island, from 6th to 21st September.[6, 7] Although chiefly interested in migration, they also discovered that a flourishing colony of Leach's petrels bred on the island—one of the only four known extant colonies in Britain. The next visitor † was Malcolm Stewart who apparently landed on most of the islands of the group in the course of two visits in August 1932.[14] Though not an ornithologist, he published a valuable paper on the status of the various petrels on these

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† The Duchess of Bedford landed in the Flannans on 15th June 1907, and her notes were published in *A.S.N.H.*, 1908: 6.—Editors.

islands.[15] Finally, in 1937 Robert Atkinson and J. A. Ainslie stayed on Eilean Mor for 4 days from 21st to 24th July.[3, 4] This paper is an attempt to collate the published observations on the breeding birds of the Flannans and to draw attention to the changes that have taken place during the past 70 years.

The following birds have, at one time or another, been recorded as breeding on the Flannans:

Leach's Petrel *Oceanodroma leucorhoa.* First discovered by Eagle Clarke in 1904 who found them " abundant, more so than the Storm-Petrel ", which in turn he described as breeding " in abundance ". Stewart in 1932 was told by the light-keepers that some forty pairs of Leach's petrels were breeding, being " confined chiefly to the area of high ground near the flag staff ". If correct, this estimate suggests an appreciable decrease since Eagle Clarke's day, but it must be regarded as suspect for, only 5 years after Stewart's visit, Atkinson and Ainslie estimated the breeding population on Eilean Mor at an absolute minimum of 200 pairs and were told by the light-keepers that the birds were increasing. In 1951 our impression was that somewhere between 250 and 400 pairs were breeding on the island. Some indication of the size of the colony may be obtained from our ringing figures. We ringed 114 adults and 9 young birds, representing some seventy-five pairs, and never refound a ringed bird. Atkinson and Ainslie [5] have given a map showing the location of the various breeding colonies on Eilean Mor, and reference to this provides further evidence that an increase is still taking place. Leach's petrels now breed almost the whole length of the northern cliff-tops (between colonies 1 and 5 on map) and colonies 1 and 2 have now merged together. Birds are also at least prospecting, if not actually breeding, along the slopes to the west of the East Landing and below the railway.

Nests were found either by " scent " during the day or by listening for the underground " reeling " note at night. The first method almost always resulted in the finding of a young bird up to about a week old (indicating that laying commenced about the last week of May), the second in the finding of a courting pair on an empty nest or, on two occasions, a courting pair with a young bird. We very seldom found eggs, which rather suggests that there might be a slackening off in breeding

activity during the light nights of midsummer, the later birds delaying operations until the return of darker nights in July. This explanation would also account for the extraordinarily protracted breeding season of this species, unfledged young birds having been found on the Flannans in November and in the Faeroes in December. Williamson,[16] dealing with the colony on Mykines in the Faeroes, has also considered the possible effect of the light midsummer nights on the petrels' breeding cycle. On the other hand, Gross [10] describes an equally protracted breeding season from islands in the Bay of Fundy at much lower latitudes where the light nights of midsummer cannot be an operative factor.

Ainslie and Atkinson [1] have described the breeding habits of Leach's petrel, based on their work on North Rona. In a subsequent paper [2] they drew attention to certain discrepancies between their findings and those of Gross [10] in America. To these may be added the following:

1. The breeding season starts in the last week of May in Britain, but not till the first or second week of June in America.
2. Colonies are decreasing fast in America, while all the evidence points to an increase on this side of the Atlantic,[5] especially in the Faeroes.[16]
3. Night activity seems to be much more restricted by light nights in America than in this country.
4. Gross recognises only one " purring " note which, he says, is the mating call and is only heard from the same burrow on one night during the breeding season. British observers do not seem to have commented on this statement, but we heard this note so often from so many burrows that we cannot believe that its use is confined to a single annual mating ceremony. Moreover, on two occasions we heard this note from burrows which proved to contain a young bird in addition to the courting adults.

Till 1951 Leach's petrels had been proved to breed on Eilean Mor alone of the Flannans group. We are indebted to Mr. Kenneth Donald of the *Mairi Dhonn* for the information that he landed on Eilean Tigh in late May 1951 and dug out

two petrels " with tails like herrings " from their burrows, which each contained an egg. The description leaves no doubt that the birds were Leach's petrels, and in any event the date is too early for storm-petrels to have laid. It may be inferred that considerable numbers are breeding on Eilean Tigh as the nests were found very quickly.

Storm-Petrel *Hydrobates pelagicus*. Harvie-Brown heard of this species as breeding on the Flannans and Eagle Clarke in 1904 described it as very numerous, breeding " on Eilean Mor, and probably on the other islands, in abundance ", though not so abundant as Leach's petrel. Stewart in 1932 was told that " Stormy petrels though known were not so common as the Leach's ", and Atkinson found them much less numerous than Leach's but mentions a colony in one of the ruined bothies. We could find only two nests, and the present breeding population on Eilean Mor probably lies between ten and forty pairs. It seems probable that there has been a decrease since Eagle Clarke's day. It may well be that the birds are being pushed out by the larger Leach's petrels, which also have the advantage of an earlier breeding season. Similar developments appear to have taken place at Mykines in the Faeroes.[16]

Manx Shearwater *Procellaria puffinus*. Harvie-Brown was told that this species bred on the Flannans but this has never been confirmed. Certainly none breed on or within earshot of Eilean Mor (which should include Eilean Tigh), but it is not impossible that there may be colonies on the more remote islands of the group.

Fulmar Petrel *Fulmarus glacialis*. This species has been surprisingly slow to colonise the Flannans considering the proximity of the old-established colony on St. Kilda. It was not until 1902 that eggs were taken on the western islands and two pairs nested on Eilean Mor for the first time in 1904.[12] Fisher's statement [9] that in this year fulmars were nesting in considerable numbers on Eilean Mor is presumably a misreading of the contemporary evidence. In 1932 Stewart saw plenty of fulmars but none actually nesting, though he was told that a few bred on the more inaccessible cliffs. In 1937 fulmars were again described as " curiously scarce; not more than ten pairs were nesting on Eilean Mor ". In July 1942 Fisher flew over the group and " found them very widespread,

nesting on the two islands of the lighthouse group, on the two biggest skerries in the west group, and on three rocks in the south group ". After another aerial survey four years later, when he found them disposed on exactly the same rocks, he estimated the total population at 100-1,000 pairs.[9] We found at least thirty pairs nesting on the cliffs of Eilean Mor. There was a flourishing colony of fifty pairs on the flat top of Lamha Sgeir Mor and another thirty to forty pairs on Lamha Sgeir Beag, while many more could be seen sitting on Eilean Tigh. A minimum of 200 pairs would probably be a safe estimate for the islands of the eastern group. The birds are clearly increasing fast, and one pair on Eilean Mor had taken over a ravens' nest of the previous year.

Cormorant *Phalacrocorax carbo*. Harvie-Brown saw " about three or four pairs " on Bronna Cleit. Eagle Clarke, in his earlier account of the birds of the Flannans, records at third hand that eggs had been taken on one of the outer islands,[6] but it may be significant that he does not mention this record in his later account.[7] Subsequent visitors have not recorded this species and it is not likely that it still breeds—if, indeed, it ever did.

Shag *Phalacrocorax aristotelis*. Harvie-Brown found this species common in all suitable places. There is no reason to suppose that any change has taken place, but most of the broods had fledged by the time of our visit.

Eider-Duck *Somateria mollissima*. Harvie-Brown found one nest on Eilean Tigh and considered that the birds were " probably dispersed over the islands in some numbers ". Eagle Clarke describes the eider as breeding commonly on some of the islands though disappearing in winter ; birds were " very numerous " during his visit in September. Since then there seems to have been a marked decrease. We never saw more than four birds at a time, and Atkinson does not mention the species at all.

Peregrine Falcon *Falco peregrinus*. Harvie-Brown records the taking of eggs and a young bird in June 1879 (island not specified) and a pair was nesting on the western group in 1904. We saw no signs of the species, nor does Atkinson mention it. The light-keepers knew the bird only as an occasional visitor, and it seems probable that the peregrines no longer breed on

the group though there is no apparent reason for their disappearance.

Whimbrel *Numenius phaeopus*. Eagle Clarke records that while the lighthouse was being built, a nest was found near the Blessing House by workmen and the eggs taken for food. There have been no subsequent breeding records.

Oystercatcher *Haematopus ostralegus*. "A few pairs observed and eggs taken on Eilean Tigh" (Harvie-Brown). On Eilean Mor, Eagle Clarke was told that several pairs bred, and Atkinson records two pairs as nesting there. Five birds were present during our visit and their behaviour suggested that there was at least one pair with young.

Greater Black-backed Gull *Larus marinus*. Harvie-Brown saw this species on Bronna Cleit, Eilean a Gobha and Eilean Tigh and considered that one or two pairs bred on every island. Two pairs were recorded as breeding on Eilean Mor and a few on the other islands by Eagle Clarke. In 1937 and again during our visit only about half a dozen individuals were to be seen and they certainly no longer breed on Eilean Mor. The scarcity of this and other species of gulls must largely account for the abundance of puffins and petrels. In this respect the Flannans make interesting comparison with North Rona where a smaller colony of puffins supports 500 pairs of greater black-backs.[8]

Lesser Black-backed Gull *Larus fuscus*. Harvie-Brown found "a few hundred pairs in all", scattered over the whole group, and specifies a few on Eilean a Gobha and Bronna Cleit and a colony on Eilean Tigh. The Eilean Tigh colony was again mentioned by Eagle Clarke, but none were then breeding on Eilean Mor. A drastic reduction has clearly taken place for Atkinson records only half a dozen birds in 1937 and we never saw one.

Herring-Gull *Larus argentatus*. Harvie-Brown describes this species as "fairly common on the Flannans" and mentions a good many on Bronna Cleit and Eilean a Gobha. In 1904 six pairs were said to breed on Eilean Mor and many on the more secluded islands of the group. Atkinson found about twenty pairs in 1937 but saw no young gulls. We saw up to half a dozen herring-gulls over Eilean Mor but they no longer breed there.

Kittiwake *Rissa tridactyla.* Much of the cliff-face on the Flannans is unsuitable for ledge-nesting birds and this and the two following species tend to be concentrated in definite colonies. On Eilean Mor kittiwakes nest chiefly round the West Landing inlet, in the East Geo and, in smaller numbers, near the East Landing. There is a good-sized colony on Lamha Sgeir Beag—probably the " stack close to Eilean Mor " where Harvie-Brown noted a considerable colony in 1881. He also found scattered colonies on the north side of Eilean Mor (where a few pairs still breed in the deep geos), on the south side of Soray and on a skerry near the landing place on Eilean Tigh, which appears to be Hamasgeir.

Razorbill *Alca torda.* Breeds in considerable numbers, but many young had fledged by the time of our visit. We ringed five young birds, two of which were shot the following winter in South Norway. The razorbills of the Flannans evidently have the same movements as those of Handa.[17]

Guillemot *Uria aalge.* Many young birds had undoubtedly departed before our arrival. On Eilean Mor, the only big colony was on the fine pyramidal stack off the west headland. Smaller numbers nest round the West Landing, in the East Geo and in the most westerly of the geos in the north coast. Harvie-Brown mentions other colonies on both east and west ends of Eilean Tigh and on the south side of either Lamha Sgeir Mor or Lamha Sgeir Beag.

A count of 500 birds showed 82 of them to be bridled—a percentage of 16.4.

Puffin *Fratercula arctica.* Breeds in vast numbers, both on Eilean Mor and Eilean Tigh, though Harvie-Brown found it comparatively scarce on the latter island. Perhaps the construction of the lighthouse and the introduction of rabbits (which apparently took place shortly after Eagle Clarke's visit) caused a slight redistribution of the population. We ringed about 400 birds, both old and young, in a quite restricted area and never refound a ringed bird. None of these has so far been recovered.

Raven *Corvus corax.* Not mentioned at all by Harvie-Brown. One pair was nesting on the outer islands in 1904 and two pairs were breeding on the group in 1937. Two pairs were said to be breeding at the time of our visit though we

never saw more than a party of three. The birds do not normally nest on Eilean Mor, but in 1950 a pair had nested in the narrow precipitous geo on the east side of that island. The nest was taken over by a fulmar in 1951.

Wheatear *Oenanthe oenanthe.* Not mentioned in Harvie-Brown's list but Eagle Clarke records four pairs as nesting on Eilean Mor. We found no evidence that they were still breeding, nor apparently did Atkinson in 1937, but the birds could have bred and left the islands by mid-July.

Meadow-Pipit *Anthus pratensis.* Atkinson in 1937 was told that several meadow-pipits nested annually though he saw none himself, nor did we see any in 1951. The Duchess of Bedford noted meadow-pipits on her visit in June 1907, and it seems probable that this species has bred on the islands from time to time.

Rock-Pipit *Anthus spinoletta.* Harvie-Brown and Eagle Clarke found this species common on Eilean Tigh and Eilean Mor respectively. Its present status on Eilean Mor is the same. Eagle Clarke commented on the remarkable tameness of the birds on Eilean Mor, but we were not struck by this. One bird with fledged young was seen to be feeding them on small fish that had obviously been dropped by puffins.

Starling *Sturnus vulgaris.* At the time of Eagle Clarke's visit starlings were known as migrants only, but in 1937 Atkinson found a flock on Eilean Mor and noted that a pair had bred in the Chapel. We found between thirty and fifty birds on the island and also found evidence of nesting in the Chapel. These birds were said to be resident on the group.

Twite *Carduelis flavirostris.* This species is mentioned only by Eagle Clarke who was told that it was a summer visitor to the islands and that two pairs bred on Eilean Mor.

The changes that have taken place during the past 70 years may be briefly summarised as follows: On the credit side starlings and fulmars have been acquired as new breeding species and the latter at least are still on the increase. Leach's petrels, too, seem to be increasing though the extent of this increase is difficult to assess owing to the birds' nocturnal habits. It is less easy to generalise about decreases as there is

no recent information from the remoter islands of the group, but it seems probable that wheatear and peregrine have ceased to breed, and the same may be said for the lesser black-backed gull which at one time was relatively abundant. Whimbrel, meadow-pipit and twite certainly no longer breed. It is very doubtful if either cormorants or manx shearwaters are still breeding, but the old records for these two species are not wholly satisfactory. There seems to have been a decrease in the numbers of storm-petrel, eider, greater black-backed gull and herring-gull. The other breeding species appear to have remained fairly stable in numbers though in the case of the auks the numbers involved are so enormous that even a considerable fluctuation might very well pass undetected.*

Migrants. Eagle Clarke has compiled an imposing list of the migrants that have been recorded at the Flannans.[7] Three migrants appeared during our stay—a skylark *Alauda arvensis* and a wheatear on 21st July, and a whimbrel *Numenius phaeopus* on the following day. On the 23rd a turnstone *Arenaria interpres* flew past the boat about 5 miles off the Flannans apparently heading south-west.

Our grateful thanks are due to Mr. George Clark and the crew of the *Mairi Dhonn* for taking us to and from the Flannans, and to the light-keepers on Eilean Mor for their very generous hospitality during our stay on the island. We are particularly indebted to Mr. Alec Tulloch who took an active interest in the birds of the Flannans during his tour of duty there and gave us invaluable assistance in the field.

* Since the preparation of this article, we have been interested to read T. B. Bagenal's account of the birds on St. Kilda in 1952 (pp. 19-24 of this volume), and to note that some of the trends mentioned above—notably the apparent loss of the peregrine, lesser black-backed gull and wheatear as breeding species—have been closely paralleled on St. Kilda. Eiders, on the other hand, have increased considerably on St. Kilda during the past twenty years. The same period has seen a big increase in starlings, but on St. Kilda this has probably been directly due to a steady increase in the sheep population since the evacuation of the island in 1931. Sheep have been grazed on the Flannans from time immemorial, but it was not until the lighthouse was built that starlings stayed to breed on the islands.

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LEACH'S PETRELS STRANDED IN SCOTLAND IN OCTOBER-NOVEMBER, 1952

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It has happened on many occasions, most often in the period of the year between 25th September and 25th November, that Leach's fork-tailed petrels (*Oceanodroma l. leucorhoa*) have been driven ashore by Atlantic gales, and have perished in considerable numbers in the British Isles and in other countries of western Europe. The type locality of the species, from which one of the three known specimens came when Vieillot described it in 1817, is in Picardy on the Channel coast of France.

Until now the most severe of these disasters on record was that which took place in the days following 26th September 1891. At that time reports were received from eighteen counties of Ireland (E. Williams, *Zoologist*, 1891 : 469), and in Scotland from a broad belt, extending north from the Borders to Mull and Angus (W. Evans, *Ann. Scot. Nat. Hist.*, 1892 : 74).

All previous records were certainly surpassed by the great "wreck" of 1952, during and after which Leach's petrels are known to have been seen alive or picked up dead, sometimes in scores, in 24 of the 33 counties of Scotland (all except Orkney, Banff, Fife, Kinross, East and West Lothian, Peebles, Renfrew and Kirkcudbright).* They were just as widespread and perhaps even more numerous in Ireland, England and Wales, and were reported on the continent in Belgium (L. Lippens, *Gerfaut*, 43 : 165), France south to the Pyrenees (C. Jouanin, *L'Oiseau and R.F.O.*, 22 : 322), and the Rhine valley in Germany and Switzerland (E. Sutter, *Orn. Beob.*, 49 : 182). More than 500 birds are accounted for in the records which follow, from Scotland alone ; and, considering that for every one found there must have been many others which perished and lay unseen, especially in woods and heather, the destruction this figure represents is immense.

* Stormy petrels, though not Leach's, were, however, reported from Orkney, Peebles and Kirkcudbright.

Though Leach's petrels nest in a few places on our northern and westernmost isles, and in Faeroe, Iceland and south Greenland, their principal breeding strongholds are evidently in eastern North America, from south Labrador and Newfoundland to Nova Scotia and Maine. Gross estimates a breeding population of over 27,000 pairs on five small islands at the entrance to the Bay of Fundy alone (*Auk*, 52 : 383, 1935). During eight North Atlantic crossings I made in May-September 1933, when careful counts were kept, the combined totals of Leach's petrels seen were distributed as follows (figures regrouped from *Proc. Boston Soc. Nat. Hist.*, 40 : 281, 1935) :

Long. degs. West	West of 60	60-50	50-40	40-30	30-20	20-10	10-0
Number seen	7	*c.* 300	*c.* 375	33	0	9	0

These figures, shown graphically in fig. 1, pertain chiefly to the non-breeding summer population ; but there is no reason to think that by the end of September or in October, when the breeding birds and young have gone out to sea, the distribution is very much different.

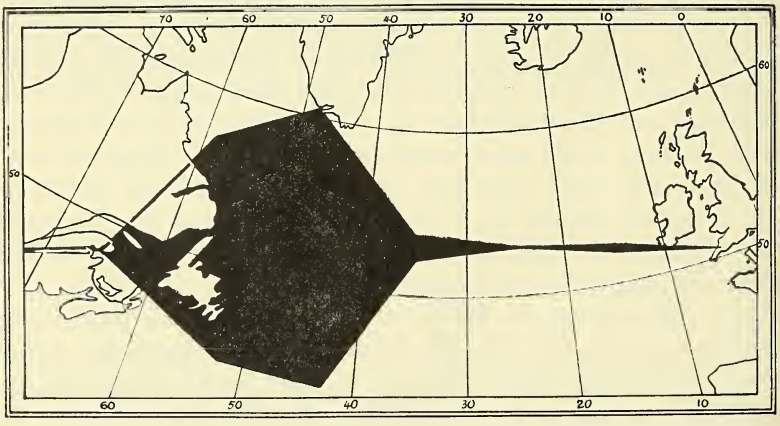

Fig. 1. Frequency of Leach's petrels on steamer routes between the St. Lawrence and English Channel in the summer months of 1933. The diagram consists of a graph of the number of birds seen in each 10-degree sector, with the map as a background.

The post-nuptial moult continues during October, and about the end of this month the birds mostly depart for the tropical and south Atlantic, where the majority seem to winter. Thus they escape the worst of the winter's storms ; but in occasional years they are overtaken by an early spell of severe gales, with more or less serious results.

During high winds at sea, water is frequently blown in a spray off the crests of the waves. Small birds like storm-petrels have no means of maintaining a grip of the water : as they reach the breaking wave-crest they must often themselves be whipped off like a ball of fluff and carried through the air. Whether they attempt to fly or to swim, therefore, they are steadily forced down wind, in spite of their best efforts to hold their position. It is probably for this reason that Wilson's petrel (*Oceanites oceanicus*), a southern hemisphere breeder, migrates north in April and May up the western side of the Atlantic, to allow the maximum room for leeway when it reaches the zone of temperate westerly winds, in which it spends the northern summer. Even the large shearwaters coming from the south, the greater and sooty (*Procellaria gravis* and *grisea*), do the same.

It is interesting to consider why Leach's petrel is particularly vulnerable on these occasions, when there are two other storm-petrels, namely *Oceanites oceanicus* and *Hydrobates pelagicus*, each smaller and less robust than Leach's, also present in the North Atlantic in the summer six months. Of the Scottish records of petrels in 1952, over 550 (it is impossible to give a precise figure for reasons apparent in the lists which follow) were Leach's, and under 25 were stormy petrels ; there were no Wilson's.

In the case of Wilson's, two important factors contributing to its escape are its earlier southward migration date, and the fact that even in the northern summer it never extends quite as far north as the others. Observers are agreed that it starts south in September and that few are left north of the tropics by late October (Roberts, *Sci. Rep. Brit. Graham Land Exp.*, 1 : 181, 1940). It is significant that the wreck of 1891, which took place just over a month earlier than the present one, brought to Scotland (Jura) its first and only recorded Wilson's petrel (H. Evans, *Ann. Scot. Nat. Hist.*, 1892 : 18),

and to Ireland the only two ever recorded there (Williams, loc. cit.).

With the stormy petrel the circumstances are rather different. The last birds do not leave their nesting places until about 1st November (Lockley, *Brit. Birds*, 25 : 206, 1932), and, though they winter as far south as the Cape of Good Hope (where they are sometimes blown ashore also ; see van Oordt and Kruijt, *Ibis*, 95 : 618, 1953), some remain in northern home waters. Yet the facts remain that in our 1952 records less than five per cent. of the petrels identified were *Hydrobates*, and that a similar disproportion has been characteristic of previous wrecks also.

The explanation in this case appears to be in part the numerical rarity of *Hydrobates pelagicus* in our latitudes. In British home waters it is of course the most numerous storm-petrel ; but we are in the northern part of its breeding range, which extends from Iceland and the Faeroes to the Mediterranean. In my eight North Atlantic transects in 1933 the total number seen between May and September was only about 70, all but three of them (which were near mid-ocean) being in the eastern half of the route followed. This compares with a total of over 750 Leach's, more than ten times the number.

The wreck

The meteorological charts in the latter half of October show an almost uninterrupted series of westerly gales over the whole area. There is thus support for the view that the Leach's petrels were driven eastward from the entire width of the North Atlantic, and indeed this appears to be the only explanation consistent with the extraordinary numbers in which they appeared on this side, and with their great numerical preponderance over the stormy petrel.

They appeared first on the coasts of southern Ireland on 24th October, or even a day or two earlier, according to information received from Major Ruttledge through Mr. Hugh Boyd.* In Scotland they were seen in a strong gale on the

* There may well have been a preliminary " wave " about the 17th-18th October. On the 17th a flock of about twenty birds, which were supposed in the light of later events to have been petrels, was seen near the east end of Loch Rannoch ; and on the 18th Miss Margaret Blackwood caught a glimpse of a

26th, along the shores of the Firth of Lorne and Loch Linnhe, and two days later in other places (including Ayrshire) along the west coast ; on the 26th also the first were found inland, one at Loch Morlich, Inverness-shire, and four or more in central Perthshire. On the 27th, 29th and 30th the birds were scattered across the country from Shetland to Berwickshire, appearing even on the east coast.

On these three days numbers of living birds were to be seen, but after the 31st no more were seen alive in Scotland, apart from a small number a week later in Skye, Lewis and Shetland (4th, 5th and 7th November) ; at that time there was evidently a subsidiary wave (fig. 2). It should be added that two quite

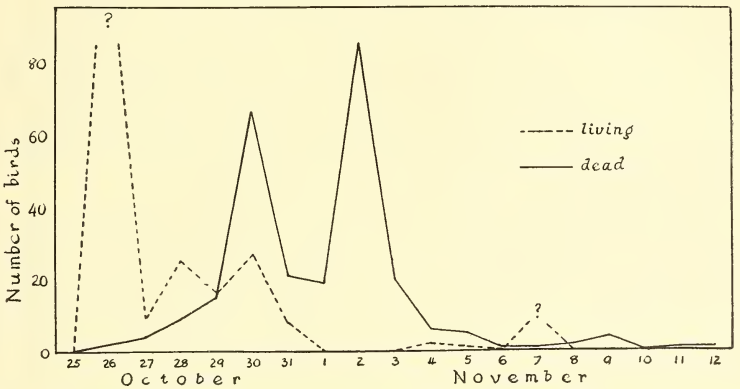

Fig. 2. Numbers of Leach's petrels living and dead reported in Scotland each day.

fresh specimens were sent to me from Pitlochry on 13th November, following a renewed gale on the night of the 10th-11th, so that there may have been, in all, four successive episodes.*

bird in company with jackdaws, flying close past the windows at Dalshian, near Pitlochry, which she afterwards recognised as having almost certainly been a petrel, during the events which occurred in very similar circumstances ten days later, as related below. A Leach's petrel was actually picked up at Croftinloan, only 400 yards from Dalshian, on the 26th, with the skull smashed ; it had already been dead some time, and must therefore have arrived before the main influx took place.

* In England and France there were still numbers of survivors on the 1st and 2nd November. In Belgium and the Rhine valley the main influx seems not to have occurred till about the 7th, some birds still being observed or taken alive as late as the 11th (Lippens, loc. cit., p. 166).

The discovery of dead birds continued here after the main wreck was over, reaching a peak the following week-end, when a number of ornithologists went out specially to search for them. Of the Saturday-Sunday total of 105, no less than 74 were picked up by Miss W. U. Flower and Miss M. I. Kinnear along three miles of beach near Barassie, Ayrshire. A small " peak " was indicated the following week-end also (fig. 2).

The incidence and dispersal of petrels over Scotland was not at all uniform (fig. 3). They were driven on to the west coast chiefly between Galloway and Mull, appearing in the largest numbers on the coasts of Ayrshire and Argyll. Inland the greatest concentration observed was in north Perthshire, in the Loch Rannoch—Aberfeldy—Pitlochry district, particularly near the junction of Straths Tummel and Tay. This district accounted for over seventy specimens. Smaller concentrations were those in upper Strathspey, chiefly between Kingussie and Boat of Garten, through the Great Glen from Fort William to the Moray Firth, and in Tweeddale from Selkirk (including Ettrick Forest) and Galashiels to Coldstream.

The distribution and frequency of the observations may be expected to reflect to some extent the density of human habitation. The number of birds reported from the hills is nevertheless surprisingly small, the one found highest being below 1,700 feet ; and it seems quite probable that the birds travelled along certain particular valleys, perhaps attempting to regain the sea further to leeward. It is clear that they did not occur in very remarkable numbers in the central lowlands, where they would have been easily found, nor were they uniformly distributed throughout the whole length of the valleys, for example, of the Tay and Tweed. The patchiness of the records has certainly a natural basis, and cannot be ascribed altogether to the unevenness of human observation.

Many of the petrels seen alive during the critical period were almost or quite at the point of exhaustion. Observers who saw them still flying more or less strongly describe them as fluttering over the ground or water, or passing by, generally toward the north-east, but not as being swept along by the gale. One Leach's petrel was said to " drop dead ", and a stormy petrel found lodged in a tree in Glen Loy had " many broken bones ". The observations in the main seem to suggest,

however, that when their position, crowded against a lee shore on the west coast, became untenable, they voluntarily retreated overland, and that they were not just carried bodily away by the wind.

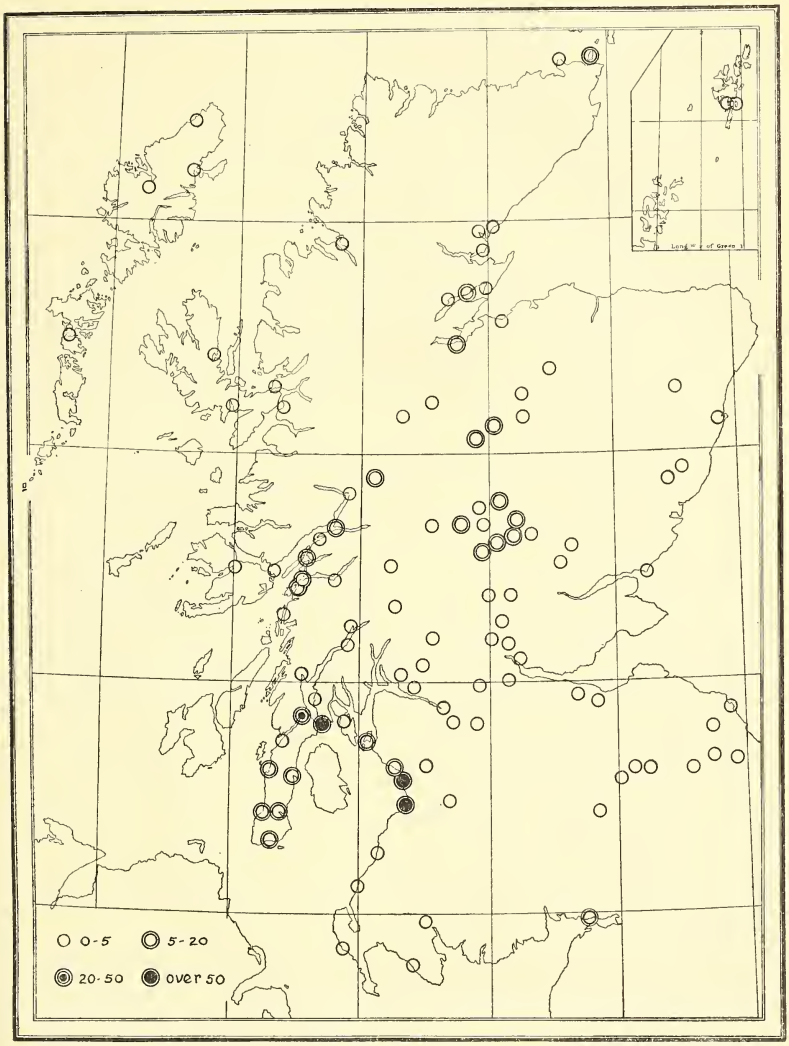

FIG. 3. Distribution of records of Leach's petrels in Scotland, October-November 1952.

Mr. Blackwood's Observations

Some of the most interesting observations were made by Mr. G. G. Blackwood at Dalshian, near Pitlochry, an extract of whose notes is printed below.

" On 28th October very severe gales struck us and, in the evening, after the wind had abated somewhat, unusually large numbers of rooks and an immense flock of jackdaws were circling over the rookery and appearing to enjoy the storm. The following morning I rose to see about thirty jackdaws evidently still at play. Flying closely packed their wings almost touched the window panes and they brushed against the side of the house. Then I saw a smaller, long-pinioned bird which they were chasing. The whole mêlée passed behind a large beech tree but I could see that the quarry had been driven down in the field beyond. I hastily threw on some clothes and had no difficulty in finding the bird. I had already seen enough of it to expect Leach's petrel. It was exhausted but alive and seemingly unharmed except for the loss of a feather or two. I planned to release it at the river in the evening but it died during the afternoon.

" The following morning, 30th October, when I rose I was not a little surprised to witness an almost exact re-enactment of the chase of the previous day. But this time the agressors were twelve rooks, and they drove the petrel to ground within 20 yards of where I had picked up the first bird. The second bird was more exhausted than the first but evidently quite unharmed. It opened its mouth wide in an attempt to squirt oil at me but none came. It clearly was starving. While we were examining it I heard excited calls from some rooks overhead and we saw six or seven of them chasing a third petrel above the rookery. They succeeded in driving it downwards but it outpaced them and disappeared to the south-east. Five minutes later a fourth petrel appeared. It too was flying south-east and when it was directly over the rookery, perhaps 25 feet above the tree tops, a solitary rook made a half-hearted dart at it but very soon gave up. Later on we picked up another petrel within twenty yards of the house. It was undamaged but I suspect foul play.

" The rooks and jackdaws probably mistook the petrels for birds of prey and resented their appearance close to the rookery, but, having driven them to earth, they would appear to have discovered their mistake, so did not finish them off. Also, the rooks' interest seemed to flag. In the first of their chases twelve birds were in hot pursuit, in the second six or seven only while in the final chase only one bird took part and that in a half-hearted

manner. It is interesting to note that although there were dozens of rooks in close proximity on the 29th October the chase was taken up exclusively by jackdaws. Conversely, on 30th October only rooks were in the hunt but plenty of jackdaws were available had they wanted to join in."

What appears to have been a similar case of the pursuit of Leach's petrels by rooks, at Kelso in the 1891 disaster, is briefly mentioned by William Evans (loc. cit.).

Weights and Measurements

Those which perished were generally emaciated, with little or none of the characteristic dermal fat, and they had undoubtedly been without sufficient food for a long time, possibly one or two weeks. Mr. Kenneth Williamson kindly sent me the body-weights of six birds, weighed on arrival at the Royal Scottish Museum by Mr. William Stirling, namely 31.3, 31.0, 30.0, 29.0, 28.5, 28.2 gm. Four birds received reasonably fresh in Aberdeen weighed 31.5, 30, 30 and 25 gm. (Combined mean of ten birds, 29.5 gm.) For comparison, the mean of sixteen summer weights taken by Gross at Kent's Island, Maine, was 43.5 gm. (*Auk*, 52 : 398, 1935), almost half as much again.

Reference has already been made to the finding of 74 dead specimens along the Barassie shore on 2nd November by Miss Flower and Miss Kinnear. Miss Flower carefully measured their wing-lengths, reproduced in the table on p. 176. There is known to be no substantial difference in size between males and females, but in fact the shortest-winged bird was a female and the longest a male : otherwise the sexes were not determined. The measurements appear to be normally distributed ; the mean wing-length is 158.7 mm. with a standard deviation of $\pm$ 3.2 mm., and the coefficient of variation is 2.0 per cent. (The mean is higher than would have been expected from the figures given in Witherby's *Handbook*, vol. 4, p. 32. However, a series of 11 specimens in Aberdeen University collection give a mean of 157.7 $\pm$ 2.5 mm., which is very similar.)

Miss Flower notes that only one bird showed no sign of moult, not having started ; the majority were about one-third way through the moult of the primaries and their coverts.

(The primary moult begins with the innermost primary in each wing and proceeds outwards.) Only four had completed the moult of primaries and secondaries, but these were still in process of moulting the tail or other parts of the plumage.

Wing-lengths of Leach's Petrels.

Wing-length (mm.)	151	152	153	154	155	156	157	158
Number of birds	1	1	3	3	4	3	12	11
Wing-length (mm.)	159	160	161	162	163	164	165	Mean 158.7
Number of birds	3	9	7	5	8	2	1	Total = 73

In 1891 one of the specimens examined by Evans had lost one of its legs, and Williams noted that, of the twenty-seven Irish specimens he received, six had the tarsus mutilated and one had the leg completely gone. Only one possibly similar case has come to our notice on the present occasion, namely a bird picked up at Drymen, Stirlingshire, " lacking the head and one foot ".

Other associated species

A number of records received refer merely to " storm petrels " without making it clear that the observers knew of more than one species, and most of these have been included among the Leach's petrels in Appendix I, with a cautionary comment. A number of others, exceeding twelve and perhaps not more than twenty-five in all, refer to *Hydrobates pelagicus ;* these are listed in Appendix II. They are confined to the western half of the country, with the exception of one at Peebles, identified with the aid of books as a stormy and not a Leach's, on being taken to the Burgh Library.

On 3rd November Miss H. MacDougall observed a grey phalarope, *Phalaropus fulicarius* close under the esplanade wall at Oban, the identity of which was confirmed by Mr. John Fraser, by whom the yellowish colour at the base of the bill and other diagnostic characters were seen. Several birds of this species were reported also in 1891 (*Ann. Scot. Nat. Hist.*, 1892 : 72).

On 2nd November Mr. S. Stevenson identified at close range a red-necked phalarope, *Ph. lobatus*, swimming 3 or 4 yards out from the edge of the surf at Ballantrae. The bill was very slender and completely black, and in flight the white wing-bar contrasted sharply with the darker wing and back feathers. This appears to be the first record for Ayrshire.

Both these species of phalaropes breed in arctic North America, as well as in northern Europe, and become oceanic or pelagic migrants, during their flight south to winter quarters at sea in low latitudes. However, the vast majority are gone from the North Atlantic before October.

Acknowledgements

I wish to acknowledge the interest and help of all the numerous correspondents who have contributed to this report, many of whom are named in the appendices. I am particularly indebted to Dr. J. W. Campbell, Major the Hon. H. M. Douglas-Home, Mr. Eric Palmar of the Glasgow Museum, Mr. David Stephen, and Dr. A. C. Stephen of the Royal Scottish Museum, all of whom prepared lists of records intimated to them. The help of certain others is acknowledged in the text. To Mr. Alexander Anderson, of the Department of Natural History, Marischal College, Aberdeen, I am most grateful for the collation of county lists, and for the detection of numerous duplicate records. Finally, I have enjoyed the fullest co-operation with Mr. Hugh Boyd at the Severn Wildfowl Trust, and Major R. F. Ruttledge, who have collected the records for England and Wales, and for Ireland, respectively.

(See Appendices commencing p. 178.)

APPENDIX I

Scottish Records of Leach's Petrels, Oct.-Nov. 1952.*

Date	*Locality*	*Number of Birds*	*Reported by*	*Remarks*
	SHETLAND			
30th Oct.	Lerwick	1	S. Bruce	
4th Nov.	Lerwick	*1*	Mrs. Johnson	
5th Nov.	Bressay	1	R. Linklater	
7th Nov.	Scalloway	*1*	R. Smith	" Large quantities for some days"
	OUTER HEBRIDES			
29th Oct.	Between North Uist and Benbecula	*1*	Dr. Alex. MacLeod	
30th Oct.	Stornoway	1	*Stornoway Gazette*	Sent to Glasgow Museum
End of Oct.	Flodda, Benbecula	2	per David Stephen	
5th Nov.	Upper Shader, Barvas	*1*	D. M. MacDonald	
9th Nov.	Benbecula	1	D. Sadler	
N.D.	Grimersta River	*1*	*Stornoway Gazette*	
	CAITHNESS			
1st Nov.	Stroma	*4*	Mrs. L. S. Simpson	
2nd Nov.	Stroma	1	Mrs. L. S. Simpson	
5th Nov.	Dunnet Head Lt. Ho.	1	J. R. Scott, per Dr. I. D. Pennie	Sent to Glasgow Museum
	SUTHERLAND			
30th Oct.	Cambusmore Gates, The Mound	1	Dr. Pennie	
31st? Oct.	Dornoch Golf Links	*1*	C. H. Donald	
N.D.	Golspie beach	1	per Hugh Boyd	
	ROSS AND CROMARTY			
17th Sept.	Ullapool	1	J. R. Matheson	
28th Oct.	Kessock, Black Isle	*5 +*	per Rev. J. Lees	
29th Oct.	Alness	*group*	per Rev. J. Lees	
30th Oct.	Invergordon	*1*	A. M. Ross, per Rev. J. Lees	
31th Oct.	Sandaig, Kyle	2	Olivia FitzRoy	
1st Nov.	Nigg	1	per Rev. J. Lees	
N.D.	Eileanreach, Glenelg	1	per Hugh Boyd	

* The lists are arranged by counties, roughly from north to south. Where the number of birds is shown in italics, they were first observed alive ; otherwise the figures refer to dead specimens. " N.D. " signifies " no date ".

Date	*Locality*	*Number of Birds*	*Reported by*	*Remarks*
	INVERNESS			
26th Oct.	Loch Morlich	*1*	Mrs. Cromar	
26th Oct.	Fort William	*1*	Jas. Foster	Strong on wing and feeding
26th Oct.	Ballachulish Bay	*6*	Mrs. Railton	
28th Oct.	Nethybridge	1	Winifred M. Ross	
28th Oct.	Onich, Ballachulish	2	Elizabeth Cameron	
29th Oct.	Newtonmore	*6*	Richard Perry	Flying north east singly
29th Oct.	Fort William	*2*	Jas. Foster	
29th Oct.	Roybridge	7 or 8	Jas. Foster	
30th Oct.	Fort Augustus	2	D. Macdonald	Sent to Aberdeen Univ.
30th Oct.	E. end of L. Insh, Kincraig	1	A. Macdonald	per C. C. I. Murdoch
30th Oct.	Newtonmore	*1*	Richard Perry	Flying from south-west
30th Oct.	Invereshie, Kingussie	1	Star Hotel	per David Stephen
31st Oct.	E. end of L. Insh, Kincraig	3	A. Macdonald	per C. C. I. Murdoch
31st Oct.	Newtonmore	2	Richard Perry	Sent to Aberdeen Univ.
31st Oct.	Boat of Garten	*1*	J. Morton Boyd	in *Kilmarnock Standard*
31st Oct.	Kingussie	1	Star Hotel	per David Stephen
1st Nov.	Kingussie	2	Star Hotel	per David Stephen
1st Nov.	E. end of L. Insh, Kincraig	1	A. Macdonald	per C. C. I. Murdoch
1st Nov.	1 mile west of Loch Insh, Kincraig	1	A. Macdonald	per C. C. I. Murdoch
2nd Nov.	Kingussie	2	Star Hotel	per David Stephen
2nd Nov.	Loch Morlich, Aviemore	2	Robin Murray	Sent to Aberdeen Univ.
4th Nov.	Sound of Raasay, Skye.	*1*	Mrs. Seton Gordon	Species uncertain
9th Nov.	Loch Slapin, Skye	1	F. N. Betts	Species uncertain
2nd Dec.	Redcliffe, Portree, Skye	1 1	Seton Gordon	4 or 6 weeks dead

Date	*Locality*	*Number of Birds*	*Reported by*	*Remarks*
	[Inverness, contd.]			
N.D.	Golf Course, Inverness	1		per Peter Scott and Hugh Boyd
N.D.	Gorthleck, at 1000 feet	1	A. G. Bull	in *The Field*, 12th Feb. 1953
	Nairn			
N.D.	Nairn	1	per Dr. A. C. Stephen	Recd. by Roy. Scot. Mus. on 4th Nov.
	Moray			
28th Oct.	Near Cromdale	1	W. Marshall	
28th Oct.	Advie	1	W. Marshall	
	Aberdeen			
29th Oct.	Aberdeen	1	Gillies Hunter	Dying ; given to Aberdeen Univ.
30th Oct.	Aquhythie, Kemnay	1	Ben Ewan	Sent to Aberdeen Univ.
	Kincardine			
1st Nov.	Fasque, Fettercairn	1	W. A. Shand	Sent to Professor James Ritchie
	Angus			
30th Oct.	Edzell	1	Dr. A. F. MacBean	
2nd Nov.	Buddon Ness	1	G. B. Corbet	
N.D.	" Angus "	1	per H. M. Douglas-Home	
	Perth			
26th Oct.	Near Loch Rannoch	1	A. V. Holden	Sent to Roy. Scot. Mus.
26th Oct.	Grandtully Stn.	1	per J. W. Campbell	
26th Oct.	Croftinloan, Pitlochry	1	H. Brown, per J. W. C.	Dead some days
26th Oct.	R. Tummel, near Pitlochry	1	H. Mackenzie, per J. W. C.	Settled and rose again from river
27th Oct.	Grandtully Stn.	1	per J. W. Campbell	

Date	*Locality*	*Number of Birds*	*Reported by*	*Remarks*
	[PERTH, contd.]			
Before 28th	Cargill	1	per A. Cross	Sent to Perth Museum
28th Oct.	Strathtay	1	Lennox Campbell	
29th Oct.	Dunblane	*1*	Thos. Brittain	Sent to Aberdeen Univ.
29th Oct.	Dalshian, Pitlochry	*2*, 1	G. G. Blackwood	
29th Oct.	Comrie	1	J. Ralston Crawford	Sent to Roy. Scot. Mus.
29th Oct.	Crieff	1	(name not given)	Sent to Roy. Scot. Mus.
29th Oct.	Murthly	1	per Mrs. Gray and J. W. Campbell	
29th Oct.	Glenfalloch, by Arrochar	*1*	per D. Stephen	Dropped dead
30th Oct.	Dalshian, Pitlochry	*3*	G. G. Blackwood	
30th Oct.	Braco	1	Jas. A. Syme	Sent to Glasgow Univ.
30th Oct.	Grandtully	1	Mrs. Bruce, per J. W. C.	Dead a few days
30th Oct.	Crieff	*1*	F. A. Notman	*Perthshire Advertiser*
31st Oct.	Ballinluig (2 miles west of)	1	H. D. Robb	
31st Oct.	Aberfeldy	1	I. Thomson, per J. W. C.	
31st Oct.	Pitlochry (2 miles east of Dalshian)	1	G. G. Blackwood	
31st Oct.	Calvine, Struan	1	per A. V. Holden	*Daily Record*
31st Oct.	Kinloch Rannoch	*2*, 1	A. S. Wilson	
31st Oct.	Dunblane	1	Thos. Brittain	Sent to Aberdeen Univ.
1st Nov.	Kinloch Rannoch	1 +	per A. S. Wilson	
1st Nov.	Blairgowrie	1	A. Thomson	Dundee *Courier and Advertiser*
1st Nov.	Grandtully Stn.	1	per J. W. Campbell	

Date	Locality	Number of Birds	Reported by	Remarks
	[Perth, contd.]			
1st Nov.	Eastertyre, Logierait	1	Nurse MacDougal	per J. W. C.
2nd Nov.	Acharn, Loch Tay	3	Grant Smith, per J. W. C.	Dead some days
3rd Nov.	Kinloch Rannoch	1	A. S. Wilson	On shore of loch
3rd? Nov.	Kinloch Rannoch	2	Major Wardlaw, per J. W. C.	Recd. on 4th.
3rd Nov.	Bank of River Earn, Comrie	1	D. MacNab, per J. R. Crawford	Sent to Roy. Scot. Mus.
3rd Nov.	Drumlean Farm, Aberfoyle	1	Major W. Joynson	
3rd Nov.	Castle Menzies, Weem	2	per J. W. C.	
4th Nov.	Glen Errochty	1	A. S. Wilson	
4th Nov.	Ballinluig	1	per J. W. C.	Recd. by Perth Mus.; had been dead a few days
4th or 5th Nov.	Croftinloan, Pitlochry	1	D. J. S. Sutherland	Sent to Univ. Coll., Dundee
Before 5th	Glen Tilt	1	per David Stephen	
7th Nov.	Pitnacree Cottage Strathtay	1	per J. W. C.	Evidently dead for some time
After 4th	Bonskied, Pitlochry	1	per Mr. Nisbet and J. W. C.	
1st week Nov.	Tummel Bridge	1	A. S. Wilson	
1st week Nov.	Glenlyon	2	J. W. Willson	Dundee *Courier and Advertiser*
9th Nov.	Comrie	1	A. Miller	per Severn Wildfowl Trust
12th Nov.	Aberfeldy Golf Course	1	per J. W. C.	Sent to Perth Mus.
13th Nov.	Faskally House, Pitlochry	2	A. V. Holden	Freshly dead; sent to Aberdeen Univ.
N.D.	Pitlochry and vicinity	6	D. J. S. Sutherland	

Date	*Locality*	*Number of Birds*	*Reported by*	*Remarks*
	[PERTH, contd.]			
N.D.	Blair Atholl	3	D. J. S. Sutherland	
N.D.	Dalno Farm Tummel Bridge	2	per J. F. de S. La Terrière and Severn Wildfowl Trust	
N.D.	Kinloch Rannoch	3	per J. F. de S. La Terrière and Severn Wildfowl Trust	
N.D.	Drumcharlte, Kinloch Rannoch	1	per J. F. de S. La Terrière and Severn Wildfowl Trust	
N.D.	Dunblane	2		*Perthshire Advertiser*
Before 17th	Acharn, on shore of Loch Tay	" a number "	R. M. Jamieson	
N.D.	Glenlyon	1	A. Miller	per Severn Wildfowl Trust
21st Nov.	Dalshian, Pitlochry	1	G. G. Blackwood	Long dead
23rd Nov.	Acharn, Loch Tay	10	Grant Smith, per J. W. C.	Majority rotten
23rd Nov.	Grandtully	1	per J. W. C.	Rotten remains
Early Dec.	Dalshian, Pitlochry	2	G. G. Blackwood	Long dead
	ARGYLL			
26th to 28th Oct.	Oban district, from Appin to Easdale	" *hundreds* "	John Fraser	
26th to 27th Oct.	Eriska, Benderloch	*6*	A. D. S. Barr	
26th Oct.	Inveraray	*1*	J. Gillespie	*Buteman*, 31st Oct.
27th Oct.	Inveraray	1	J. Gillespie	*Buteman*, 31st Oct.
27th Oct.	Glenbarr, Kintyre	*1*	F. M. B. Macalister	Flying south-west against wind
N.D.	Inveraray	1	per D. Stephen	" A few days prior to 29th "
27th Oct.	Ardmarnoch, Kilfinan	1	per D. Stephen	
28th Oct.	Glenbarr, Kintyre	*1*	F. M. B. Macalister	Also flying south-west
28th Oct.	Muasdale, Kintyre	4 to 5	F. M. B. Macalister	
28th Oct.	Inveraray	*1*	Rev. D. W. MacKenzie	*Buteman*, 31st Oct. (Species uncertain)

Date	*Locality*	*Number of Birds*	*Reported by*	*Remarks*
	[ARGYLL, contd.]			
28th Oct.	Sound of Mull, near Craignure	*2 to 3*	F. W. Betts	(Species uncertain)
28th Oct.	Oban harbour	*6*	A. D. S. Barr	
28th Oct.	Connel Ferry	*several*	J. Morson	*Scotsman*
29th Oct.	Knockalava, Lochgilphead	1	per D. Stephen	(Presumed Leach's)
30th Oct.	Tarbert, Kintyre	*6*	A. Cumming	Flying about harbour
30th Oct.	Ballachulish Ferry	*2*	F. W. Betts	
30th Oct.	Southend, Machrihanish, Campbelltown and Carradale	40 to 50	Various observers per Dr. J. A. Gibson	" Dead and dying "
N.D.	Clachan, W. Loch Tarbert	*1*	A. Cumming	Flew into shed and died
N.D.	Taynuilt	*1*	Mrs. V. W. Huntingdon	per Severn Wildfowl Trust
N.D.	" Kintyre shores "	1	Dugald Semple	*Kilmarnock Standard*
N.D.	Tarbert	2 dozen	per D. Stephen	Dead or dying, before 2nd Nov.
N.D.	Loch Fyne	∞	per D. Stephen	More than observer, a fisherman, had ever seen before
N.D.	Campbelltown	*great numbers*	By fishermen	per D. Stephen
1st Nov.	Gruline, Mull	1	Miss A. Livingstone	(Species uncertain)
1st Nov.	Strachur	1	per Hugh Boyd	
1st Nov.	Dunstaffnage Mains, Connel	1	per D. Stephen	
2nd Nov.	Cuil Bay, Appin	2	Mrs. Parnell	
2nd Nov.	Glen Orchy	1		Sent to Miss W. Flower
2nd Nov.	Mouth of Duror, Appin	1	Major G. H. Malcolm	per G. Waterston
3rd Nov.	Oban	1	J. Fraser	" Several miles inland "
5th Nov.	Rhu, west Loch Tarbert	1	D. A. Byatt, R.N.V.R.	Dead 4 to 6 days

Date	*Locality*	*Number of Birds*	*Reported by*	*Remarks*
	BUTE			
26th Oct.	Straad, West Bute	1	Mrs. D. McLean, and *Buteman*	Species uncertain
27th Oct.	Millport	*1*	T. Bagenal	Probably Leach's
N.D.	Millport	*4*	per T. Bagenal	Species uncertain
N.D.	Garrison Lodge, Millport	*1*	per D. Stephen	Dying ; species uncertain
N.D.	Little Cumbrae Lt. Ho.	*1*	per D. Stephen	Species uncertain
After 31st	Rothesay	2	From Marquess of Bute	per J. W. C.
	DUMBARTON			
3rd Nov.	Crosskeys	1	Miss E. R. Brock	
About 3rd	Clydebank High School	1	per Miss E. R. Brock	
N.D.	Borhill	1	per D. Stephen	
	STIRLING			
30th Oct.	Bonnybridge	*1*	per D. Stephen	Dying
Before 4th	Falkirk	1	per D. Stephen	
Before 4th	Kilsyth	1	per D. Stephen	
9th Nov.	Drymen	1	I. C. Christie	Dead about 1 week ; lacked head and 1 foot
	CLACKMANNAN			
30th Oct.	Menstrie School	*1*	R. McOwan	Dying
N.D.	Alloa	1	per D. Stephen	In week 29th Oct. to 5th Nov.
N.D.	Clackmannan	1	per D. Stephen	In week 29th Oct. to 5th Nov.
N.D.	Kincardine on Forth	1	per D. Stephen	Beginning of Nov.
	MIDLOTHIAN			
30th Oct.	Liberton	1	per Dr. A. C. Stephen	Sent to Roy. Scot. Mus.
31st Oct.	Gogar	1	Mrs. Blackwood, per Cdr. T. Yeoman	Sent to Roy. Scot. Mus.

Date	*Locality*	*Number of Birds*	*Reported by*	*Remarks*
	BERWICK			
30th Oct.	Reston	1	Major F. Kerr	
30th Oct.	Hirsel, Coldstream	1	per Dr. A. C. Stephen	Sent to Roy. Scot. Mus.
28th Oct. to 4th Nov.	Eyemouth	1	per Dr. A. C. Stephen	Sent to Roy. Scot. Mus.
3rd Nov.	Edrom	1	Miss Joy Edwards	Dead for a few days
	ROXBURGH			
27th Oct.	Below Galashiels	1	per A. J. Smith	Sent to Roy. Scot. Mus.
1st Nov.	Kelso	1	R. R. Hogarth	
	SELKIRK			
29th Oct.	Melrose Water-Works (Selkirk)	*1*	per A. J. Smith	Flying strongly ; species uncertain
30th Oct.	The Inch, Ettrick	1	A. J. Smith	Sent to Roy. Scot. Mus.
31st Oct.	Cloverfords	1	per Dr. A. C. Stephen	Sent to Roy. Scot. Mus.
3rd Nov.	Hangingshaw, Yarrow	1	A. J. Smith	
Before 4th	Selkirk	1	Dr. R. A. M. Scott	
11th Nov.	Dalgleish, Ettrick	1	A. J. Smith	Decayed ; at 1600-1700 feet
	LANARK			
29th Oct.	Glasgow, south side	1	per D. Stephen	
30th Oct.	Househillwood, Glasgow, S.W.	1	W. P. Prefect	Sent to Glasgow Mus.
30th Oct.	Church St. School, Partick	*1*	D. Anderson	Dying ; sent to Glasgow Mus.
2nd Nov.	Uddingston	1	Miss A. Turnbull	Sent to Aberdeen Univ.
3rd Nov.	Drumchapel	1	Miss A. Kelly	per Miss W. U. Flower
	AYR			
28th Oct.	Stevenston, along shore	*7*	Miss M. I. Kinnear	Feeding
29th Oct.	Stevenston along shore	1	Miss M. I. Kinnear	
29th Oct.	Prestwick Airport	*1*	A. McRae	Dying

Date	*Locality*	*Number of Birds*	*Reported by*	*Remarks*
	[Ayr, contd.]			
N.D.	Prestwick Golf Course	*c.* 12	W. A. Waddell	29th and after
30th Oct.	Girvan	2	Jas. Fulton	Died ; sent to Glasgow Mus.
30th Oct.	Girvan	8	per Jas. Fulton	
30th Oct.	Old Daily, nr. Girvan	1	Cdr. G. Hughes-Onslow	
30th Oct.	St. Nicholas Links, Prestwick	*1*	J. H. Wilson	Dying
30th Oct.	Esplanade, Prestwick	" *small flock* "	J. H. Wilson	
30th Oct.	Troon	1	A. E. Jeffers	Recently dead
N.D.	Troon	1	A. E. Jeffers	Partly eaten
31st Oct.	Girvan	2	Jas. Fulton	
31st Oct.	Bargany, Girvan	1	per D. Stephen	
31st Oct.	Stinchar valley, 1 mile from Ballantrae	2	S. Stevenson	Dying ; one sent to Glasgow Mus.
31st Oct.	Esplanade, Ayr	2, 1	per D. Stephen	
N.D.	Prestwick Bathing Lake	*c. 50*	*Kilmarnock Standard*	Given whisky by American soldiers
N.D.	Kilmaurs, Kilmarnock	1	*Kilmarnock Standard*	
31st Oct.	Dean Park, Kilmarnock	1	*Kilmarnock Standard*	
1st Nov.	Auchinleck	1	per D. Stephen	
2nd Nov.	Barassie shore (3 miles)	74	Miss W. U. Flower and Miss M. I. Kinnear	
3rd Nov.	Stevenston	5	Miss Kinnear	
3rd Nov.	Ayr	2	D. MacWatt	per S. Stevenson: sent to Glasgow Mus.
N.D.	River Ayr near Auchincruive	2	per Cdr. Hughes-Onslow	
6th Nov.	Caprington Castle, Kilmarnock	1	Col. W. W. Wallace	
8th Nov.	Doonfoot, Ayr	1	Miss W. I. Rome	Probably a week old
8th Nov.	Troon	1	R. B. Napier	Dead some time

Date	*Locality*	*Number of Birds*	*Reported by*	*Remarks*
	WIGTOWN			
N.D.	Port William	1	per D. Stephen	
	DUMFRIES			
30th Oct.	Annan, tide-line between Dornock Brow and Torduff Point	2, *5*	per D. Stephen	One sent to Carlisle Mus.

APPENDIX II

Scottish Records of Stormy Petrels, Oct.-Nov. 1952.

Date	*Place*	*Number of Birds*	*Reported by*	*Remarks*
6th Nov.	Ophir School, Orkney	1	*Orcadian*, 6th Nov.	
N.D.	Marybank, Stornoway, Lewis	1	*Stornoway Gazette*, 7th Nov.	
30th Oct.	Loch Broom, Ullapool, West Ross	*1*	J. R. Matheson	
N.D.	Sleat, Skye	1	per H. W. Douglas-Home	Week of 28th Oct. to 4th Nov.
29th Oct.	Spean Bridge, Inverness-shire	1		Sent to D. Stephen
3rd Nov.	Glen Loy, Inverness-shire	1	C. McLean	Had broken bones ; dead 24 hrs.
N.D.	Fort William, Inverness-shire	several	*Oban Times*, 8th Nov.	
28th Oct.	Oban harbour, Argyll	*1 +*	A. D. S. Barr	
28th Oct.	Oban harbour, Argyll	*several*	J. Fraser	
N.D.	Oban district, Appin to Easdale	several	J. Fraser	
26th to 28th Oct.	Connel Ferry, Argyll	*a few*	J. Morson	*Scotsman*, 7th Nov.
29th Oct.	Poltalloch Farm Lochgilphead	*1*		Dying; sent to D. Stephen

Date	*Place*	*Number of Birds*	*Reported by*	*Remarks*
5th Nov.	Tweed Bridge, Peebles	1	Mr. Wells	per W. T. Blackwood
28th Oct.	Portpatrick, Wigtown	1	Dr. T. Thin	
7th Nov.	Glencaird, Bargrennan, Kirkcudbright	1	G. McKerrow	per James Fisher
3rd Nov.	Stevenston, Ayr	1	Miss M. I. Kinnear	

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Revenue Account for Volume 64 (1952)

Income	Year to 30/6/53	Expenditure	Year to 30/6/53
Credit balance from Vol. 63	£25 16 9	Printing	£365 7 0
Contribution from S.O.C.	25 0 0	Paper for text	37 19 0
Subscriptions received	587 12 3	Paper for covers	10 0 0
Add: Subscriptions in advance at 30/6/52	78 14 1	Paper for plate	0 11 6
	£717 3 1	Printed notices	7 4 9
Less: Subscriptions in advance at 30/6/53	246 13 4	Printed stationery	8 14 7
	£470 9 9	Authors' reprints (complimentary)	5 15 11
Sale of back numbers	11 6 1	Authors' reprints (ordered)	58 1 1
Sale of reprints to authors	70 14 4	Postage (distribution)	11 7 2
Advertisement space	4 10 0	Postage (general)	8 16 2
		Receipt books	0 13 9
		Index cards	0 16 10
		Back numbers for exchange	1 9 6
		Commission on cheques	0 15 6
		Bank service charge	0 7 0
		Clerical services	10 0 0
		Credit balance	29 0 5
	£557 0 2		£557 0 2

BOTANICAL NOTE

Some New Records of Stoneworts (Charophyta) in Scotland.—In the course of investigations of several Scottish freshwater lochs which are being studied by workers from the Brown Trout Research Laboratory, Pitlochry, a number of interesting finds of Charophytes have been made which seem worthy of placing on record.

From Lochindorb, Morayshire (v.-c. 95), considerable growths of the very small and delicate *Nitella confervacea* Br. were collected in a mud sample from twelve feet of water by Mr. A. V. Holden. This very rare British species, though occurring in a few localities in Ireland, has previously been found in Scotland only in the Isle of Harris, whilst there is no record of it having been found in England.

Another very rare British stonewort has been found in the Loch of Marlee, Perthshire (v.-c. 89), this being *Nitellopsis obtusa* J. Groves, which has not previously been recorded from Scotland though it has been found very occasionally in some of the Norfolk Broads in England. This plant was also collected by Mr. Holden.

Chara delicatula Ag. var. *annulata* (Wallm.) G. and B. W., previously known only from localities in the far north of Scotland (Sutherland, Orkney and Shetland) has been found in three lochs in Perthshire, these being Loch Dunmore (v.-c. 89), Loch Kinardochy (v.-c. 88), and Lochan an Daim (v.-c. 88). It has also been found in Lochindorb, Morayshire.

Considerable growths of *Chara hispida* L. have been found in Loch Moraig, Perthshire, which is a new record for this species in v.-c. 89. Another new record for this vice-county is *Chara rudis* Leonhardi, small pieces of this plant having been collected in bottom-grab samples taken from Loch Choin by Mr. W. R. Munro.

More detailed accounts of some of these finds are to be published elsewhere by Mr. G. O. Allen, M.A., F.L.S., whom the author of this note wishes to thank for his generous assistance in helping to identify these Charophytes.—Alan J. Brook, Brown Trout Research Laboratory, Pitlochry.

ZOOLOGICAL NOTES

***Velia saulii* Tamanini in Morayshire.**—E. S. Brown (*Ent. Mon. Mag.*, 87 : 297) has shown that the water bug hitherto known as *Velia currens* F. consists in Britain of two species, *V. caprai* Tam., the common form, and *V. saulii* Tam., only recorded from a few localities in southern Scotland and once from England. It may therefore be of interest that I found, in October 1953, a male and female of *saulii* in a small stream a mile from Elgin, in company with many of the common species. Their identity has been kindly confirmed by Mr. E. S. Brown.—R. Richter, Gordonstoun.

The Snake-fly *Raphidia* (*Agulla*) *maculicollis* Stephens (Megaloptera) in Kincardineshire.—On 22nd February 1953 I found a larva of *A. maculicollis* under bark of dead *Pinus sylvestris* near the Bridge of Feugh, Banchory, Kincardine, and on 6th June 1953 I caught two males only a few yards distant from the site of the larva, one on the branches of *Quercus robur* and the other just after it settled on the trunk of a pine. No other specimens were seen during search in the region on later dates. These are the first Scottish specimens I have seen, for the larva of a species of snake-fly found under bark of pine on 9th September 1948 at Bucksburn, Aberdeen, had almost certainly been imported from Germany with unbarked logs also sheltering large numbers of timberman beetles *Acanthocinus aedilis* and the bark beetle *Ips sexdentatus*.

Many locality records exist of the four species of snake-flies found in England. After considerable search of entomological literature for records from Scotland all I discovered was a note by Lucas (1927-28) that *R. maculicollis* had been found at Braemar and Morayshire. I am familiar with the appearance and habits of snake-flies in the southern counties of England and I had expected to find the insects in the northern half of Scotland during the last thirty years, in the course of frequent visits to woods at all seasons searching for insects on tree trunks and under dead bark. My failure to see adults or larvae every year may indicate that they are scarce. However, from the nature of Scottish woods and the known distribution of the species on the continent of Europe, it seems that at least *maculicollis* should be widely distributed in Scotland, and that it is a matter of finding the weeks in summer when adults are on the wing, and of looking from autumn to the end of spring for larvae or pupae below the bark of dead trunks and branches in a suitable state of decay.

Of the fairly extensive but scattered British literature the following papers may be mentioned: Fraser (1951), The entomological fauna of the New Forest; II. Order Neuroptera (Habits in the woods), *Jour. Soc. Brit. Ent.* 3, pp. 226-227; Killington (1929), Synopsis of British Neuroptera (Megaloptera, Planipennia), *Trans. Ent. Soc. Hampshire S. of England*, 1, pp. 1-36, 6 plates; Lucas (1927-28), Notes on British Snake-flies (*Raphidia*) (Bionomics, distribution, key to adults), *Proc. Trans. S. Lond. Ent. N. H. Soc.*, pp. 34-41, plates 3-4; Syms (1934-35), Biological notes on British Megaloptera; ibid., pp. 121-124; Syms (1949-50), Notes on British Snake-flies (Bionomics, distribution); ibid., pp. 176-178, plates 16-18.—Guy D. Morison, Aberdeen.

Further records of *Crataerina pallida* (Latr.) (*Hippoboscidæ Diptera*) in Scotland.—On 16th July 1953 my colleague Dr. J. H. Sudd captured a "flat fly" which, on examination, proved to be a gravid ♀ *C. pallida*. The fly was removed from a fledgling swift (*Apus apus*) which had floundered in a Dundee garden. The specimen has been lodged in the museum of this department. —A. R. Edwards, University College, Dundee.

A hippoboscid fly taken on 15th August 1953 by Mr. A. Notman in his house at Crieff, mid Perthshire, has been identified here as the above species.

The host of this ectoparasite is usually the swift, and a recently vacated nest of this bird was found by Mr. Notman in the eaves of his house.

The specimen has been presented to the Royal Scottish Museum. —W. T. Stirling, Royal Scottish Museum, Edinburgh.

Since Mr. B. G. Thompson recently called attention to the lack of records of this species in Scotland (*Scot. Nat.*, 64 : 72, 1952), one record has already been published, by Dr. J. A. Downes, of a specimen taken from a wounded swift, also at Crieff, in 1948 (loc. cit., p. 166).—Editors.

A Further Record of the Flea *Tarsopsylla octodecimdentata* (Kol.) in Scotland.—As it is now fifty-five years since *Tarsopsylla octodecimdentata* (Kolenati), 1863, has been collected in the British Isles it is of interest to record that one female of this species was obtained from a male red squirrel *Sciurus vulgaris* trapped in a pine wood at Glen Muick, Aberdeenshire, on 29th March 1953. 2 ♂ and 1 ♀ of *Monopsyllus sciurorum sciurorum* (Schrank), 1893, were also found in company with the single specimen of *T. octodecimdentata*.

The only previous records of *T. octodecimdentata* in the British Isles are 2 ♂ and 9 ♀ from (the Pass of) Killiecrankie, Perthshire, ex *Sciurus vulgaris* and 1 ♀ from Pitlochry, Perthshire, 16th March 1898 (M. Pease) taken from the same host (Smit, *Scot. Nat.*, 65 : 5, 1953). Unfortunately neither the date nor collector is known for the former record but it has been suggested by Smit that both records may have originally belonged to one batch.

So far then, as this flea has only been obtained from mountainous regions in the East of Scotland, the distribution of *T. octodecimdentata* is apparently very restricted in this country. It may be noted that Pitlochry (or Killiecrankie) and Glen Muick are only 40 miles apart although the intervening terrain is very rough and sparsely wooded and therefore hardly able to support *Sciurus vulgaris*. Two observations made by the author on squirrel fleas may be of interest in this connection.

> *Monopsyllus sciurorum*—One of this red-squirrel flea from a bank vole *Clethrionomys glareolus* caught at 1,600 feet above sea level near Braemar, Aberdeenshire on 19th September 1949.
>
> *Orchopeas wickhami* (Baker), 1895—One female also taken from a bank vole at 1,700 feet near Braemar on 19th September 1949. This flea is a parasite of the grey squirrel *Sciurus carolinensis* and from this evidence appears to be spreading more quickly than its true host.

The tree-line in this particular part of Braemar is at 1,400 feet so that in both cases the specimens were collected at least 200 feet above the level of the nearest trees. The actual distance between these two points is approximately 400 yards. It may well be then that squirrel fleas are able to survive on voles for a considerable period. Further research on this problem is desirable and it is hoped to pursue this line of investigation in the future.

I am deeply indebted to Messrs. R. Bell and W. S. Fyfe, of Glen Muick, for sending the source of this specimen of *T. octodecimdentata* to the Natural History Department, University of Aberdeen, and also to the Departmental Staff for allowing me to examine the squirrel.

My best thanks are also due to Mr. F. G. A. M. Smit of the British Museum, Tring, who kindly verified my identifications of some of the Siphonaptera.—Ronald M. Allan, Aberdeen.

Magnificent Frigate-bird in Scotland.—An interesting addition to the list of rare birds visiting the British Isles has been made by the finding of a frigate-bird, *Fregata magnificens rothschildi*

Mathews, in the island of Tiree, Inner Hebrides. It was found near a freshwater lochan in an exhausted condition on the morning of 9th July 1953, by Mr. John Graham. In spite of every care it died on the evening of the same day. It was forwarded to the Royal Scottish Museum, where it was made into a cabinet skin, and this has now been incorporated in the collections through the kindness of His Grace the Duke of Argyll. It was identified by Sir N. B. Kinnear.

The bird was a female, not fully adult, with a wing span of 6 feet 6 inches.

This sub-species breeds in the West Indies and the adjacent coasts of Central and South America ; two other sub-species breed in the Cape Verde Islands and the Galapagos Islands respectively. In winter it ranges more or less regularly north to Louisiana and Florida, and it has occurred three times in eastern Canada (in the Lower St. Lawrence, Nova Scotia and Newfoundland). In Europe it appears to have been recorded on three previous occasions, namely at the mouth of the Weser in Germany in 1792, and in France at Saumur in 1852 and La Rochelle in 1902.*

The body was forwarded to Mr. David R. R. Burt, St. Andrews University, who reported that a number of tape-worms belonging to the genus *Tetrabothrius* were present but, owing to the state of preservation, could not be more fully identified.

One specimen of the hippoboscid fly *Olfersia spinifera* Leach, identified by Mr. H. Oldroyd, British Museum (Natural History), was found.

Three species of Mallophaga, identified by Miss T. Clay, British Museum (Natural History), were *Edmanniella aurifasciata* (Kelly), *Colpocephalum angulaticeps* Piaget, and *Pectinopygus crenatum* (Giebel).—A. C. Stephen, Royal Scottish Museum, Edinburgh.

It is understood that in the forthcoming 5th Edition of the *A.O.U.* Check-list the name " man-o'-war-bird ", which has hitherto designated this species in earlier editions, is to be changed to " magnificent frigate-bird ", with the prefix " Caribbean " for the sub-species *rothschildi*.—Editors.

Pomatorhine Skuas in Forth.—On 28th November 1953 I observed a party of four pomatorhine skuas *Stercorarius pomarinus* between Portobello and Seafield. All four were light-phase birds, with white faces and white underparts, and all four showed a narrow, but distinct, pectoral band of dark brown. Only one, however, had the broad, rounded and elongated central tail-feathers which are distinctive of this species. Even at a distance,

*See postscript on p. 156.

the birds were noticeably bigger and heavier than the arctic skua, and the whitish patches at the bases of the primaries much more prominent in flight.

I watched the party on four different occasions in the course of the day. They kept close together, cruising around at a fair height most of the time as if prospecting ; but apart from one occasion when they swept in low over a bunch of long-tailed ducks, they made no attempt to " raid " other birds.

In view of *The Handbook's* statement that " passage lasts to end November " the date is perhaps worth noting.—W. Kenneth Richmond, Glasgow.

Inland nesting of Herring Gull.—To the records which have already been published (*Brit. Birds*, 41 : 277 ; 43 : 94 ; *Scot. Nat.* 63 : 196 ; 64 : 180) of the inland breeding of the herring gull *Larus argentatus* I can add that on 23rd May 1947 my wife and I visited a breeding colony of the black-headed gull *Larus ridibundus* at 1,125 feet above sea level on Meall a' Choire Odhair, about 3½ miles north-west of Braco, Perthshire. On the way up, at about 1,100 feet, and a short distance before reaching the black-headed gull colony, we flushed from a nest a herring gull. The nest, which was in heather, contained two eggs.

We have not visited this colony since that date and have no information regarding the present status.—Alexander Cross, Monifieth.

Mr. Cross has been able to supply the measurements of these eggs, and also a photograph of the nest.—Editors.

Herring Gull nesting on a roof top.—In 1951 I reported that a pair of herring gulls *Larus argentatus* nested successfully on the chimney stack of a dwelling-house in Cellardyke, East Fife (*Scot. Nat.*, 64 : 122). I have been informed that they nested there again this year and reared three young.—W. J. Eggeling, Morogoro, Tanganyika.

Five successive broods in Stock-dove's nest.—With reference to previous notes under this heading (*Scot. Nat.*, 64: 121 and 179), the stock-dove *Columba oenas* in the hollow walnut tree reared five broods again this year. On 1st April I ringed two young, 4th May two young, 7th June two young, 25th July one young, and 29th August two young. What makes me sure that it is the same parent is that she usually, if not always, starts incubating a new lot of eggs before the young of the preceding brood have left the nest.—James Bartholemew, Torrance, near Glasgow.

The Black-billed Cuckoo in the Shetlands.—An unfamiliar bird was found by Mrs. D. M. Gear on Foula, Shetland, on 11th October 1953 ; it was in an exhausted condition and died on the following day. The specimen was sent to the British Museum (Natural History), where I was able to identify it as the black-billed cuckoo, *Coccyzus erythropthalmus*, a bird which is normally confined to the New World.

The black-billed cuckoo usually breeds in an area extending from south-eastern Alberta to Arkansas and eastwards to Georgia and up to the St. Lawrence River. In winter it migrates to Colombia, Ecuador and Peru. Stragglers have been recorded in Greenland and the Azores and once each in Italy, England and Ireland. This is the second record of the black-billed cuckoo in the Scottish area (see *Scot. Nat.*, 63 : 131).

The Meteorological Office reports that from Wednesday 7th October the winds were predominantly westerly at strong to gale force off Newfoundland and the northern parts of the eastern seaboard of the U.S.A., and these gradually spread eastwards across the Atlantic. By the week-end of the 10th and 11th October the wind in the Shetland area was southwesterly at strong to gale force. These winds over the Atlantic are generally typical for the time of the year. The conditions suggest that the bird, which was in a weakened condition, was driven past the north of Ireland and Scotland by the strong southwesterly wind to the Shetlands, and that it is unlikely that the bird reached the Shetlands by way of Greenland and Iceland, because of the adverse winds.

We owe a debt of gratitude to Mrs. Gear for sending the specimen to be identified, for by doing so she has enabled this interesting record to be made known.

The specimen has been added to the National Collection.

R. W. Sims, British Museum (Natural History), London.

Yellow-billed Cuckoo at Montrose.—On 11th October 1953 a yellow-billed cuckoo *Coccyzus americanus* was seen under ideal conditions near Old Montrose, Angus, at the west shore of the Montrose basin. It was first spotted by a party of eight ornithologists on their way home from the annual conference of the Scottish Ornithologists' Club at Aberdeen, and later it was shown to five others, including Mr. George Waterston and Mr. A. G. S. Bryson, who happened to be prospecting the same area. We had all studied during the week-end, and many of us on that same day, the skin of one of the two previous specimens found in Scotland the same autumn and we had no difficulty at all in identifying the

bird. All the prominent features—the chestnut patch on the wing, the dark tail edged and tipped with white, and the yellow lower mandible—were seen at close range and in good light with a battery of optical instruments.

The bird seemed fit and active, diving into cover like a shrike, flitting between the beech trees where it was feeding, or flying with a characteristic flicking wing-action and fast bouncing flight. The general shape was slim, with a long tail which was often cocked like a blackbird's on landing, and pointed wings often held drooped like a perching swift's. It sidled up the branches keeping mostly to the tops of the trees but allowing approach to within a few yards. It fed occasionally on the undersides of the leaves and once held a large caterpillar in the bill for some time before swallowing it.

A full description was taken.—C. K. Mylne, Edinburgh.

Grasshopper Warbler in Ross-shire.—On 17th June 1935 a grasshopper warbler *Locustella naevia* was heard singing near the head of Loch Maree, on the Beinn Eighe Nature Reserve. I heard the bird singing again on 20th and 22nd June. Despite careful searching I was never able to see the bird, but there was no mistaking the song. Mr. Andrew Currie, Nature Conservancy, also heard and saw the bird. No evidence of a pair or breeding was found.

Elizabeth A. Garden, Aberdeen.

A Stoat trapped on Great Cumbrae.—On 2nd April 1953 a male stoat *Mustela erminae* was trapped on Great Cumbrae Island. It had a head and body length of $10\frac{1}{2}$ inches and the tail measured 4 inches to the last vertebra, while the black tip of the tail was $3\frac{3}{4}$ inches long. This is the only record of a stoat on Great Cumbrae within living memory, and Hugh Boyd Watt (" The land mammals of the Clyde faunal area ", *Proc. Nat. Hist. Soc. Glasgow*, 7, n.s., 1902-05: 170-189) states that although long known on Bute it is not found on Arran or the other Clyde islands. How this stoat reached Great Cumbrae is not known; the minimum distances to be covered if it swam are about $1\frac{1}{4}$ miles from the mainland or $2\frac{1}{4}$ miles from Bute. The capture has had considerable local publicity and no one has confessed to importing stoats. About a year ago much building material was brought across to the island in lorries and the possibility of being introduced by accident cannot be ruled out.—T. B. Bagenal, Marine Station, Millport, Isle of Cumbrae.

BOOK REVIEWS

Finding Nests. By Bruce Campbell. London : Collins, 1953. Pp. 256 with 24 plates. 12s. 6d.

There is a definite need for a modern book on bird's-nesting, an art of much importance in the study of bird biology, which has been largely neglected for thirty years and more. As the author says, " the modern generation of bird-watchers, reacting from the tainted association of bird's-nesting with egg-collecting, were not brought up to find nests ".

This need is admirably filled by Bruce Campbell's practical book. After an introductory chapter summing up the reasons for finding nests there is a chapter on methods of finding them. The simplest, but perhaps least productive, method is " cold " searching, looking in every likely situation ; alternatively one may use the method of " hot " searching involving the use of sticks for tapping likely bushes or a rope for dragging over open country. Patient observers can combine nest finding with observations on behaviour, by watching the bird back to the nest from a point of concealment. Following this is a useful chapter describing methods of looking at nests in such a way as to cause least disturbance to the nest-site and giving detailed advice on how to climb trees with ropes or irons.

The main part of the book is devoted to a systematic account of the British breeding species giving all the information pertinent to finding their nests. For each species there are sections dealing with distribution, breeding season, habitat, nest-site, nest, eggs (when considered relevant to the search) and special methods required for finding the nest. The book is thoroughly to be recommended to all who wish to find nests, whether for serious ornithological reasons or as " a sport in its own right ".—I. M. G.

The Glasgow and West of Scotland Bird Bulletin. Edited and published by Dr. J. A. Gibson, 39 Strathmore Avenue, Ralston, Paisley. Vol. 1, 20 pp., Dec. 1952, price 1s. 3d. ; vol. 2, No. 1, pp. 1-12, Mar. 1953 ; No. 2, pp. 13-28, June 1953 ; No. 3, pp. 29-48, Oct. 1953 ; price 1s. each, 3s. 6d. per annum. Duplicated typescript.

This has been closely modelled on the successful *Edinburgh Bird Bulletin*, taking for its area " the whole of the south and west of Scotland and Inner and Outer Hebrides ". The first four numbers include ten or more local lists, some of which are based on rather brief periods of observation and do not contain much that merits notice ; others, such as the list of the birds of Southend, Argyll, by James Greenlees (vol. 2, p. 33), are of more substantial value. Each issue contains an editorial, several brief articles and a number of short notes, and there are also reviews, notices, and references to current literature.

These Bulletins and others like them automatically assume a place in the periodical literature of regional or local ornithology. What appears in them has, in fact, been placed on permanent record, because they will be preserved in libraries for future reference and quotation. We may be forgiven therefore for reiterating that the greatest care is required to make sure that the records given are full enough to carry conviction and to be acceptable to others, both now and in the future. To give examples, in the article on rare birds in the Clyde area (vol. 2, p. 31), supporting evidence is certainly required for the three cream-coloured coursers, and the six eagle owls, which are so unexpected that the reader's natural scepticism ought to have been deliberately disarmed ; otherwise few will accept the records. In the article (p. 38) on the fulmar colonies of Kintyre, to take another example, the dates of the authors' visits are relevant and should be stated, to enable the reader to assess the reliability of the figures ; for unless all the ledges were actually reached and the broody adults dislodged, it might well have been impossible to distinguish between those birds which were really breeding and those which were merely shamming, at least until the chicks became visible. Space is clearly at a premium in this sort of publication, but brevity may have inherent dangers.

Dr. Gibson has spared neither time nor trouble in the production of the Bulletins, and it is gratifying therefore to read of their still-growing circulation. V. C. W-E.

Studies on British Beechwoods. By J. M. B. Brown. Forestry Commission Bulletin No. 20. London: H.M. Stationery Office, 1953. 100 pp. and 28 pp. of plates. 12s. 6d.

This comprehensive report on a survey of the British beechwoods makes a valuable contribution to our knowledge of woodland ecology. The beechwoods are classified on a soil basis into chalk, limestone, calcareous glacial drift, non-calcareous loam and sand types. This classification underlies the descriptions of the status of the species by regions, and all the subsequent chapters on such topics as the effect of site factors, the silviculture of beech, the problems of establishment by natural regeneration or planting, and the flora of beechwoods. The sections on the fungal, insect and vertebrate enemies of the tree are complete yet lacking in detail, but the discussion of the value of beech leaf litter is instructive and clarifying.

The author believes that Scotland lies outwith the optimum climatic zone for beech growth and regeneration, although he reserves for the species a place as a major forest crop in certain favourable soil sites of the southern and eastern regions, and acknowledges the good quality of some beech stands as far north as Inverness. Throughout Britain generally it has prospects of expanding cultivation and wider utilisation.

This bulletin is a very praiseworthy work of primary interest to the professional forester with a technical knowledge of soil science and ecology. It is well illustrated, and is written in a good scientific style, but it makes few concessions to those naturalists who recognise woodland plants by the common English names and dispense with the scientific ones.

CORRESPONDENCE

THE EDITORS,
THE SCOTTISH NATURALIST

21 PRESTON ROAD,
BRIGHTON,
SUSSEX

DEAR SIR,

Crossbill Immigration : Request for records

Nineteen fifty-three has seen a great " irruption " of crossbills from the Continent. Since mid-June when the first birds appeared the species has been recorded all over the British Isles from Shetland to Cornwall, from Kent to the Outer Hebrides, and from Suffolk to the westernmost of the islands off the Irish coast.

The Editors of *British Birds* magazine have asked me to collate all records of the species for this year, and for early 1954, and to prepare a connected account for publication in their journal. I would therefore be very grateful to any readers of the *Scottish Naturalist* if they would send to me at the address given above, records of any immigrant crossbills they may have seen. Records should include the following information, where known : number in each flock (with sex and age details if determined), locality (including nearest town), date, the observer's name (in capitals please) and any further remarks on habitat (e.g., species or type of tree frequented), food, association with other species or evidence of actual migration.

Only 1953 records are called for at present, but in order that the full biological significance of the immigration can be determined it is impotrant that follow-up observations on wintering birds, a return migration early in 1954 and on nesting birds in February and March, be made and also collated. I would welcome any such 1954 records as they are made, otherwise by the end of May 1954. All records will be acknowledged individually and in the published account. Records already sent to *British Birds*, the *Scottish Naturalist* and to Dr. Bruce Campbell at the B.T.O., Oxford, have been passed to me.

I am,
Yours truly,
J. H. R. BOSWALL.

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